

EARTH SYSTEMS I

EASA - 101

Sections 1 and 2

Test Review

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Earth Systems Section 1 Test 1 - 1

Place all answers on the answer sheet unless otherwise directed.

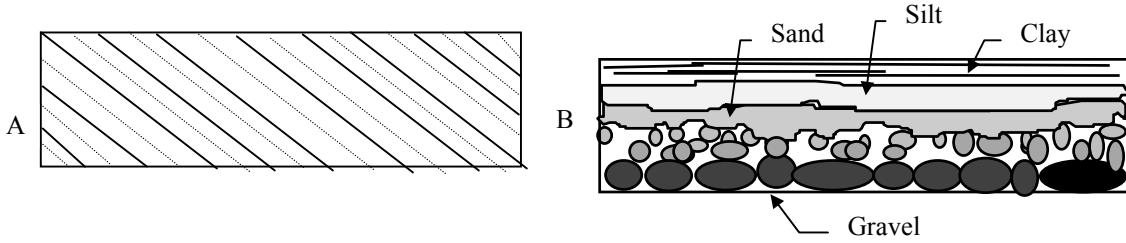
1. Identify the word or term best described by each of the following statements.
 - a. Name of melt when it is at the ground surface.
 - b. In place weathered rock debris that is not yet a soil.
 - c. Term to describe an igneous rock that contains only large crystals.
 - d. Lithification process which binds grains together by crystal growth in pore spaces.
 - e. Partially decomposed organic debris in a forest that produces an acid.
 - f. Process whereby rock pieces break free and sink into a melt.
 - g. General term for the fact that sedimentary rocks have layering.
 - h. Lava with smooth, ropy or corded surface that is usually mafic in composition.
 - i. Natural, inorganic, solid, homogenous element or compound with a crystalline structure.
 - j. Pedalfer soil horizon enriched in iron, aluminum and clays.
 - k. Metamorphism involving only hot, mineral-rich water.
 - l. Contracting cooling magma produces these cracks forming six-sided stacks of rock.
 - m. Type of metamorphism associated with faults and igneous intrusions.
 - n. Term for the hot, mineral-rich water that forms at the end of Bowen's Reaction Series.
 - o. Except for this property, all others are controlled only by the number of protons.
 - p. Gypsum, travertine and rock salt are this type of non-clastic sedimentary rock.
 - q. Term for all non-igneous rocks surrounding an igneous intrusion.
 - r. General term for lapilli, dust, bombs and blocks.
 - s. Size, shape and boundary relationship of grains, crystals or particles.
 - t. Coarse grained sedimentary rock composed of large angular rock fragments.
 - u. Deep erosional valleys that cut across the shelf and slope.
 - v. The name for the small crystals that surround phenocrysts.
 - w. Term for the mixing of sediments by organisms resulting in homogenous bedding.
 - x. Term for layering observed within some metamorphic rocks.
 - y. View of the layering within a soil.
 - z. Name for the type of sea covering the continental shelf.
 - aa. Natural solid mixture of different minerals, organic remains, rock fragments or glass.
 - bb. Name for the zone of metamorphism surrounding an igneous intrusion.
 - cc. Mixture of water and sediment that flows down the continental slope.
 - dd. Igneous rock associated with diamonds.
 - ee. Name for gaps that form as clay-rich sediment dries and shrinks.
 - ff. These gradually expand, merge and form the continental rise.
 - gg. Other name for igneous body that forms volcanically.
 - hh. Different types of sediment deposited in different places at the same time.
 - ii. Rock produced by low grade metamorphism of a shale.
 - jj. Process responsible for preserving olivine so that it does not all become pyroxene.
 - kk. General term for converting sediments into sedimentary rock.
 - ll. Basic shape of the silicate structure which can link to form chains, rings and sheets.
 - mm. Particles that swirl about the nucleus of an atom.
 - nn. Preserved stoped rock.
 - oo. Textural term for a porous volcanic rock.
 - pp. In place rounded mass of rock with a different composition than the bed found in.

- qq. Name of volcanic structure that forms from very viscous lava that oozes from a vent.
- rr. Metamorphosed limestone or dolostone.
- ss. Term for a watery solution enriched in hydroxyl ions.
- tt. Column of igneous rock formed in the volcanic neck and exposed by erosion.
- uu. Volcanic, super heated, dust-rich gas cloud that flows across the landscape.
- vv. Wide depression that forms when top of a volcano collapses inward.
- ww. Calcium-rich deposit that forms atop very arid pedocal.
- xx. Compositional term for viscous, silica rich lava.
- yy. Geode becomes this when crystals fill the void space.
- zz. General term for features formed on the top of a bed, but preserved on base of overlying bed.

2. True or False. Place a **T** or an **F** in the blanks. *Do not write the words true or false.*

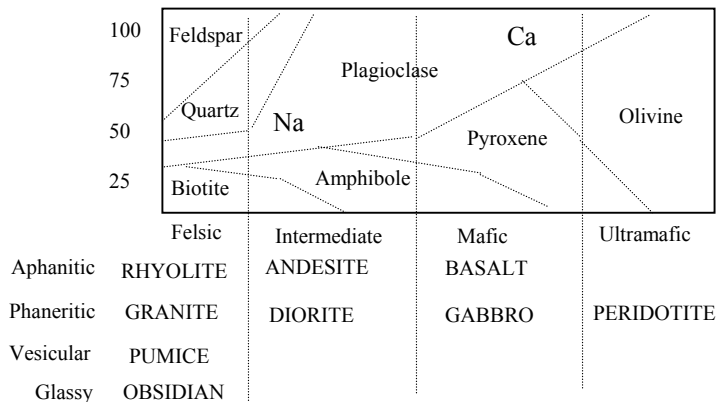
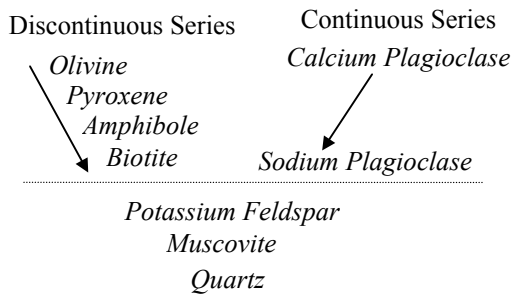
- a. Classification of the igneous rocks is based upon composition and colour.
- b. Olivine and calcium plagioclase have the highest melting point of the igneous minerals.
- c. Dikes and sills are similar in shape but different in orientation to the adjacent layers.
- d. An extinct volcano no longer has the ability to erupt.
- e. Turbidity currents produce graded bedding.
- f. Plutons only become visible when exposed by erosion.
- g. Current ripples are only formed by waves.
- h. Phaneritic rocks form if lava cools slowly and does not contain large amounts of gas.
- i. Load casts, flame structures and pseudonodules are all sole markings.
- j. Shield volcanoes are mainly composed of lava flows.
- k. Aa and poehoehoe both flow in the same manner.
- l. Laterites can become the mineral bauxite, a major source of aluminum.
- m. K feldspar, Muscovite and Quartz are part of the continuous series.
- n. Parent material is the most important factor is determining type of soil that forms.
- o. Juvenile water refers to the steam released during a volcanic eruption.
- p. The rate of chemical weathering doubles for each 10°C rise between 0° and 100°C.
- q. Batholiths are usually concordant.
- r. Relict structures may reveal the original layering of an homogenous bed.
- s. Quiet eruptions are most commonly associated with mafic lavas.
- t. Metaconglomerate forms only by metamorphosing a conglomerate.
- u. The first minerals that form in Bowen's series are also the first likely to weather.
- v. Some rocks listed as non-foliated may be foliated, but the foliation is not visible.
- w. Disintegration facilitates decomposition by increasing surface area.
- x. Pillow lavas form when fluid lavas erupt under water.
- y. Compaction and water loss are enough to convert clay-rich sediments into rock.
- z. The spinning of the Earth on its axis forces magma to migrate towards Earth's surface.
- aa. Granite forms only in high grade metamorphism.
- bb. The terms "sand", "silt" and "clay" only indicate size, not composition.
- cc. Rock colour can result from mineral content, particle size and staining.
- dd. To be called a fossil, an object must have been part of an organism.
- ee. Heat and pressure make rocks more pliable in metamorphism.

3. Using the terms in the word bank, identify the type of bedding illustrated below.

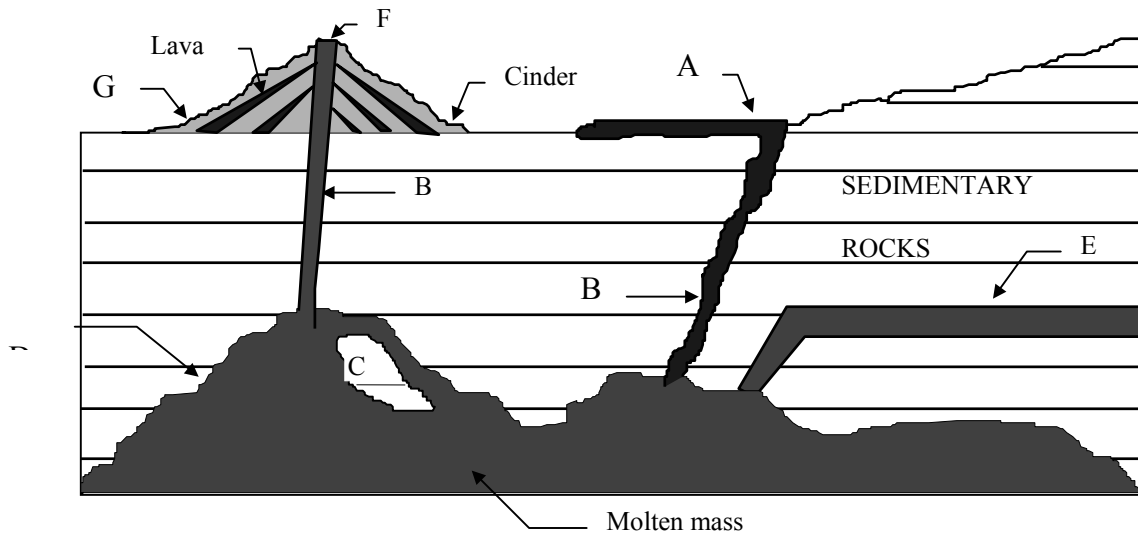


4. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated below. Use the word bank to answer the following questions.

- 4a.** A piece of granite is placed into a container and slowly heated. What will be the first mineral within the granite to melt? **4b.** What will be the last?
- 4c.** A piece of gabbro is placed into a container and is slowly heated. What will be the first mineral to melt? **4d.** What will be the last?
- 4e.** A piece of pumice is melted completely and the melt is allowed to cool very slowly. What igneous rock will likely be produced?
- 4f.** A piece of rhyolite is placed outdoors and allowed to weather. What will be the first mineral likely to show signs of chemical weathering? **4g.** What will be the last?
- 4h.** A piece of peridotite is placed outdoors and allowed to weather. What will be the first mineral likely to show signs of chemical weathering? **4i.** What will be the last?



5. Identify the features and igneous bodies illustrated on the cross section below. Use the terms provided in the word bank



1. A horizon
2. aa
3. acid
4. active volcano
5. amphibole
6. andesite
7. aphanitic
8. ash
9. atomic number
10. atomic weight
- 11 aureole
12. B. horizon
13. basalt
14. base
15. batholith
16. bauxite
17. biochemical rock
18. biotite
19. bioturbation
20. blocks
21. bombs
22. Bowen's reaction series
23. breccia
24. C horizon
25. Ca plagioclase
26. caliche
27. cauldrea
28. cementation
29. chalk
30. chemical compounds
31. chemical weathering
32. chert
33. cinder
34. cinder cone
35. clastic
36. claystone
37. coal
38. columnar jointing
39. compaction
40. composition
41. concordant
42. concretion
43. conglomerate
44. contact metamorphism
45. continental rise
46. continental shelf
47. continental slope
48. continuous series
49. country rock
50. cross bedded
51. current ripples
52. cut and fill structure
53. desiccation
54. diatreame
55. dike
56. diorite
57. discontinuous series
58. discordant
59. dolostone
60. dormant volcano
61. dust
62. electrons
63. epicontinental sea
64. explosive eruption
65. extinct volcano
66. extrusive
67. felsic
68. fissure
69. flame structure
70. foliated
71. fossil
72. frost action
73. gabbro
74. geode
75. glassy
76. gneiss
77. graded bedded
78. grades of metamorphism
79. granite
80. groundmass
81. high grade metamorphism
82. homogenous bedding
83. humus
84. hydrothermal fluids
85. igneous bodies
86. igneous rock
87. inorganic chemical rocks
88. intermediate
89. intermediate eruption
90. intrusive
91. juvenile water
92. K feldspar
93. kimberlite
94. laccolith
95. lapilli
96. laterite
97. lava
98. lava flow
99. lava dome
100. limestone
101. lithification
102. load cast
103. low grade metamorphism
104. mafic
105. magma
106. magmatic differentiation
107. marble
108. metaconglomerate
109. metamorphic rock
110. metamorphism
111. metasomatism
112. mineral
113. mudcracks
114. muscovite
115. Na plagioclase
116. neutrons
117. nodules
118. non-clastic rocks
119. nucleus
120. nueé ardente
121. obsidian
122. olivine
123. parent material
124. peat
125. pedalfer
126. pedocal
127. pericontinental sea
128. peridotite
129. phaneritic
130. phenocryst
131. phylite
132. physical weathering
133. pillow lava
134. plutonic
135. pohoehoe
136. porphyritic
137. proton
138. pseudonodules
139. pumice
140. pyroclastic debris
141. pyroxene
142. quartz
143. quartzite
144. quiet eruption
145. regional metamorphism
146. regolith
147. relict structure
148. rhyolite
149. ripple marks
150. rock
151. rock cycle
152. rock gypsum
153. rock salt
154. salts
155. sandstone
156. schist
157. sedimentary facies
158. sedimentary rock
159. sediments
160. shale
161. shield volcano
162. silicates
163. sill
164. siltstone
165. slate
166. soil profile
167. sole marking
168. stoping
169. strata; stratum
170. stratification
171. stratovolcano
172. submarine canyon
173. submarine fans
174. symmetrical ripples
175. tetrahedron
176. texture
177. tool marks
178. travertine
179. turbidity current
180. ultramafic
181. vesicular
182. volcanic
183. volcanodynamic
184. vug
185. weathering
186. xenolith
187. zones of metamorphism

1. Place the **number** corresponding to the correct term from the word bank into the blank.

a. 97	l. 38	w. 19	hh. 157	ss. 14
b. 146	m. 44	x. 70	ii. 165	tt. 54
c. 129	n. 84	y. 166	jj. 106	uu. 120
d. 28	o. 10	z. 127	kk. 101	vv. 27
e. 83	p. 87	aa. 150	ll. 175	ww. 26
f. 168	q. 49	bb. 11	mm. 62	xx. 67
g. 170	r. 140	cc. 179	nn. 186	yy. 184
h. 135	s. 176	dd. 93	oo. 181	zz. 167
i. 112	t. 23	ee. 113	pp. 117	
j. 12	u. 172	ff. 173	qq. 99	
k. 111	v. 80	gg. 66	rr. 107	

2. Place a T or F in the blank. Do not write the words.

a. F	i. F	q. F	y. T
b. T	j. T	r. T	z. F
c. T	k. F	s. T	aa. T
d. F	l. T	t. F	bb. T
e. T	m. F	u. T	cc. T
f. T	n. F	v. T	dd. F
g. F	o. F	w. T	ee. T
h. T/F	p. T	x. T	

3, 4 and 5. Place the **number** for the correct term from the word bank into the blank

3a. 50	4d. 122/25	5f. 54
3b. 77	4e. 79	5a. 98
	4f. 5/115/25	5b. 55
4a. 142	4g. 142	5c. 186
4b. 5/115/25	4h. 122/25	5d. 15
4c. 5/115/25	4i. 141/115	5e. 163

Earth Systems Section 1 Test 1-2

Place all answers on the answer sheet unless otherwise directed.

1. **Vocabulary:** Identify the term best described by each of the following statements.

- a. Part of the atom that determines most of its chemical and physical properties.
- b. Water that never existed before and is released in a volcanic eruption as steam.
- c. Name of the fine grained, crystalline igneous rock produced from lava.
- d. Name for regolith or soil that is eroded, transported and deposited.
- e. Lava surface characterized by a jagged, broken and sharp outer crust.
- f. Mineral that can formed from a laterite soil an is enriched in aluminum.
- g. Horizon containing regolith or partially weathered parent rock in a mature soil profile.
- h. Lava with smooth, ropy or corded surface that is usually mafic in composition.
- i. Sedimentary rock formed by the lithification of non-stratified clay.
- j. Pedalfer soil horizon enriched in iron, aluminum and clays.
- k. General term for plutons which parallel adjacent layers of sedimentary rock.
- l. Continuous massive accumulation of sediment at the base of the continental slope.
- m. Flooded outer edge of the continental coastal plains.
- n. Said of a volcano that is not erupting and not highly eroded.
- o. Long narrow crack in the ground out of which lava flows.
- p. Sedimentary structure intermediate between a load cast and pseudonodule.
- q. Crystal-lined spherical cavity within a sedimentary rock.
- r. Aqueous solution enriched in hydrogen ions.
- s. Type of soil upon which caliche may possibly form.
- t. General name for the large crystals found in a porphyritic textured rock.
- u. Metamorphic rock produced by metamorphosing a calcite sandstone.
- v. General term for minerals that dissolve readily in water.
- w. The most abundant group of minerals on Earth.
- x. General term for markings left by objects moving across the surface of sediment.
- y. General name for the area of altered rock that surrounds an igneous intrusion or fault.
- z. When organisms destroy layering and features in a layer of sediment.
- aa. Growth of crystals in pore spaces and part of the lithification process.
- bb. Spherical to subspherical structure with the same composition as the containing layer.
- cc. Smallest class of the pyroclastic debris material.
- dd. Metamorphic rock produced in the high grade metamorphism of granite.
- ee. Name for gaps that form as clay-rich sediment dries and shrinks.
- ff. General term for all rocks formed by the cooling and crystallization of a melt.
- gg. Other name for igneous body that forms volcanically.
- hh. Abundant accumulation of this material at the surface is required for a pedalfer to form
- ii. Type of lava commonly produced as fluid basaltic lava erupts underwater.
- jj. Largest of all volcanoes and composed almost exclusively of lava.
- kk. Type of ripples produced by waves near the shoreline.
- ll. Phenomenon mainly responsible for transporting sediment to the deep ocean floor.
- mm. Produced by the high grade metamorphism of peat.
- nn. Another name for disintegration.
- oo. Volcano composed of alternating layers of lava and pyroclastic debris.
- pp. Igneous texture where rock is composed of very small crystals.
- qq. Soil in which the a and B horizon are bright red and largely indistinguishable.
- rr. Body of water that floods the low-lying interior of a continent.
- ss. Smallest of the three type of particles composing an atom.
- tt. Layering within metamorphic rocks.

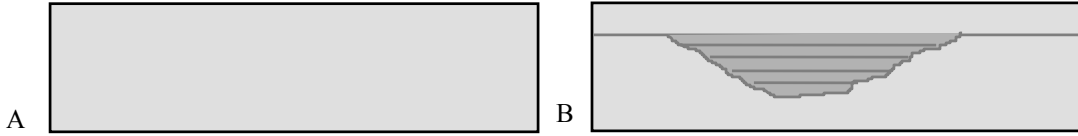
- uu. Crystals sinking to the bottom of a magma chamber and being preserved.
- vv. Hole in the ground about which a volcano forms.
- ww. Lava surface type formed from fluid, hot, mafic, gas-poor lava.
- xx. Preserved traces of original bedding found within an homogenous stratum.
- yy. Xenoliths are produced by this process.
- zz. Formed by the differential settling of heavier sediments into lighter sediments.

2. **Content:** True or False. Place a **T** or an **F**, *not the words true or false*, in the blanks.

- a. Minerals may be elements or chemical compounds.
- b. All parts of the geolithosphere are solid.
- c. The Earth is a closed system.
- d. All silicate minerals are essentially constructed of tetrahedrons.
- e. The composition of igneous rocks largely determines their texture.
- f. Minerals of the discontinuous series are increasing complex as the series progresses.
- g. All stoped blocks become xenoliths.
- h. Columnar jointing forms as a melt dries and contracts.
- i. Poehoehoe lavas are generally produced by more viscous lavas than are aa lavas.
- j. By weight and volume, steam is the most abundant volcanic material released.
- k. Volcanic explosiveness is a function of melt temperature, composition and gas content.
- l. Once extinct, a volcano never erupts again.
- m. Shield volcanoes are usually composed of rhyolite.
- n. Water is a unique substance because it expands as it freezes.
- o. An important function of physical weathering is to increase surface area and reduce particle size.
- p. Decaying plant material generally releases acid.
- q. Soil type is strongly controlled by amount of precipitation.
- r. In both pedalfer and laterite soils calcium and magnesium compounds are removed.
- s. All sedimentary materials undergo erosion, transportation and deposition before lithification.
- t. Compaction and desiccation are sufficient to convert sand into a sandstone.
- u. Thick bedded strata required longer to form than thin bedded strata.
- v. All bedding plane features must form before the bedding plane is buried by the next layer.
- w. Dark-coloured grains in sedimentary rocks are less susceptible to colour by staining.
- x. Deposition on land tends to be more temporary than deposition in the sea.
- y. Turbidity currents enlarge the submarine canyons and the submarine fans.
- z. Most xenoliths would be expected to show signs of metamorphism.
- aa. Porosity is generally increased during metamorphism.
- bb. Grade of metamorphism can be indicated by rock type as well as mineral composition.
- cc. Some non-foliated may be foliated, but the foliation is not evident.
- dd. For a new rock to be formed, an existing rock must be destroyed.
- ee. For metamorphism to occur, heat, pressure and hydrothermal fluids must all be present.
- ff. The continental slope forms a steep incline from the shelf to the ocean floor.
- gg. Bioturbation creates the cavities in which geodes and vugs later form.
- hh. Unlike most pedalfers, laterites are typically depleted in silica.
- ii. In the same climate, different soil types would develop on rhyolite and basalt.
- jj. Chemical weathering would be slow in deserts and polar regions.
- kk. Plutons only become visible when exposed by erosion.
- ll. Melt composition is altered with migration, and cooling.

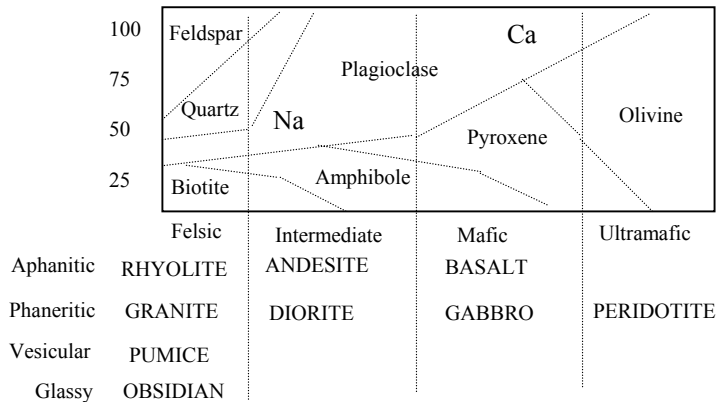
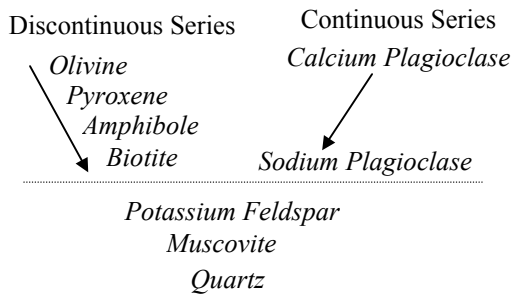
Diagrams and Graphs

3. Using the terms in the word bank, identify the type of bedding illustrated below.



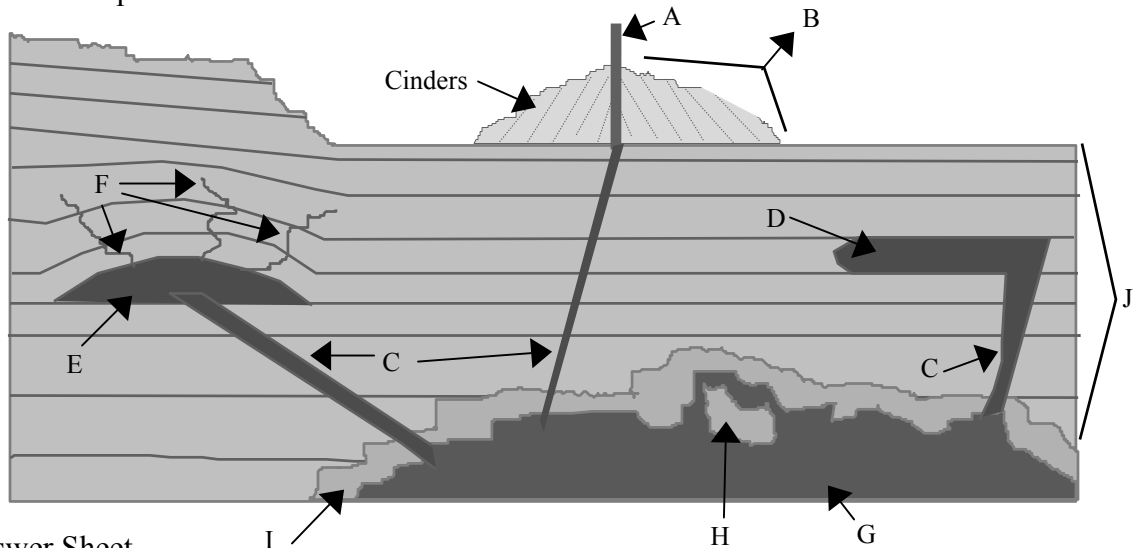
4. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated below. Use the word bank to answer the following questions.

- 4a. A piece of basalt is placed into a container and slowly heated. What will be the first mineral within the basalt to melt? 4b. What will be the last?
- 4c. A piece of andesite is placed into a container and is slowly heated. What will be the first mineral within the andesite to melt? 4d. What will be the last?
- 4e. A piece of obsidian is melted completely and the melt is allowed to cool very slowly. What igneous rock will likely be produced?
- 4f. A piece of granite is placed outdoors and allowed to weather. What will be the first mineral likely to show signs of chemical weathering? 4g. What will be the last?
- 4h. What type of igneous rock will be the first to form as magma is cooled? 4i. What will be the last?



1

5. Identify the features and igneous bodies illustrated on the cross section below. Use the terms provided in the word bank



Answer Sheet.

1. Place the **number** corresponding to the correct term from the word bank into the blank.

- | | | | | |
|----------|----------|-----------|-----------|------------|
| a. 134__ | l. 41__ | w. 155__ | hh. 81__ | ss. 60__ |
| b. 89__ | m. 42__ | x. 167__ | ii. 128__ | tt. 68__ |
| c. 12__ | n. 58__ | y. 39__ | jj. 154__ | uu. 102__ |
| d. 152__ | o. 66__ | z. 18__ | kk. 165__ | vv. 170__ |
| e. 2__ | p. 67__ | aa. 25__ | ll. 168__ | ww. 16__ |
| f. 15__ | q. 71__ | bb. 38__ | mm. 77__ | xx. 144__ |
| g. 21__ | r. 3__ | cc. 59__ | nn. 127__ | yy. 106__ |
| h. 131__ | s. 121__ | dd. 73__ | oo. 162__ | zz. 98/159 |
| i. 32__ | t. 125__ | ee. 108__ | pp. 8__ | |
| j. 11__ | u. 103__ | ff. 85__ | qq. 94__ | |
| k. 37__ | v. 147__ | gg. 64__ | rr. 61__ | |

2. Place a T or F in the blank. Do not write the words.

- | | | | | |
|--------|--------|--------|---------|---------|
| a. T__ | i. F__ | q. T__ | y. T__ | gg. F__ |
| b. T__ | j. T__ | r. T__ | z. T__ | hh. T__ |
| c. F__ | k. T__ | s. F__ | aa. F__ | ii. F__ |
| d. T__ | l. F__ | t. F__ | bb. T__ | jj. T__ |
| e. F__ | m. F__ | u. F__ | cc. T__ | kk. T__ |
| f. F__ | n. T__ | v. F__ | dd. T__ | ll. T__ |
| g. F__ | o. T__ | w. T__ | ee. F__ | mm. T__ |
| h. F__ | p. T__ | x. T__ | ff. F__ | |

3, 4 and 5. Place the **number** for the correct term from the word bank into the blank

- | | | | | |
|-------------|-------------|-----------|-----------|----------|
| 3a. 80__ | 4c. 139__ | 4h. 123__ | 5C. 52__ | 5I. 10__ |
| 3b. 48__ | 4d. 138/129 | 4i. 76__ | 5D. 156__ | 5J. 45__ |
| | 4e. 76__ | | 5E. 92__ | |
| 4a. 5/129 | 4f. 5/129 | 5A. 51__ | 5F. 169__ | |
| 4b. 116/129 | 4g. 139__ | 5B. 30__ | 5G. 14__ | |
| | | | 5H. 173__ | |

- | | | | |
|----------------------------|-------------------------------|----------------------------|------------------------|
| 1. A. horizon (top soil) | 58. dormant volcano | 110. neutrons | 167. tool marks |
| 2. aa | 59. dust | 111. nodules | 168. turbidity current |
| 3. acid | 60. electrons | 112. non-foliated | 169. vein |
| 4. active volcano | 61. epicontinental sea | 113. nucleus | 170. vent |
| 5. amphibole | 62. explosive eruption | 114. nueé ardente | 171. vesicular |
| 6. andesite | 63. extinct volcano | 115. obsidian | 172. vug |
| 7. anthracite coal | 64. extrusive | 116. olivine | 173. xenolith |
| 8. aphanitic | 65. felsic | 117. open system | |
| 9. ash | 66. fissure | 118. parent material | |
| 10. aureole | 67. flame structure | 119. peat | |
| 11. B horizon (subsoil) | 68. foliation | 120. pedalfer | |
| 12. basalt | 69. frost action | 121. pedocal | |
| 13. base | 70. gabbro | 122. pericontinental sea | |
| 14. batholith | 71. geode | 123. peridotite | |
| 15. bauxite | 72. geolithosphere | 124. phaneritic | |
| 16. bedding planes | 73. gneiss | 125. phenocryst | |
| 17. biotite | 74. graded bedded | 126. phyllite | |
| 18. bioturbation | 75. grades of metamorphism | 127. physical weathering | |
| 19. bombs | 76. granite | 128. pillow lava | |
| 20. breccia | 77. graphite | 129. plagioclase | |
| 21. C horizon | 78. groundmass | 130. pluton | |
| 22. caliche | 79. high grade metamorphism | 131. pohoehoe | |
| 23. carbonates | 80. homogenous bedding | 132. pore space | |
| 24. cauldrea | 81. humus | 133. porphyritic | |
| 25. cementation | 82. hydrogen ion | 134. proton | |
| 26. chalk | 83. hydrothermal fluids | 135. pseudonodules | |
| 27. chemical weathering | 84. hydroxyl ion | 136. pumice | |
| 28. chert | 85. igneous rock | 137. pyroclastic debris | |
| 29. cinder | 86. intermediate | 138. pyroxene | |
| 30. cinder cone | 87. intermediate eruption | 139. quartz | |
| 31. clastic | 88. intrusive | 140. quartzite | |
| 32. claystone | 89. juvenile water | 141. quiet eruption | |
| 33. closed system | 90. K feldspar | 142. regional metamorphism | |
| 34. coal | 91. kimberlite | 143. regolith | |
| 35. columnar jointing | 92. laccolith | 144. relict structure | |
| 36. compaction | 93. lapilli | 145. rhyolite | |
| 37. concordant | 94. laterite | 146. ripple marks | |
| 38. concretion | 95. lava dome | 147. salt | |
| 39. conglomerate | 96. limestone | 148. sandstone | |
| 40. contact metamorphism | 97. lithification | 149. schist | |
| 41. continental rise | 98. load cast | 150. sedimentary facies | |
| 42. continental shelf | 99. low grade metamorphism | 151. sedimentary rock | |
| 43. continental slope | 100. mafic | 152. sediments | |
| 44. continuous series | 101. magma | 153. shale | |
| 45. country rock | 102. magmatic differentiation | 154. shield volcano | |
| 46. cross bedded | 103. marble | 155. silicates | |
| 47. current ripples | 104. melt | 156. sill | |
| 48. cut and fill structure | 105. metaconglomerate | 157. siltstone | |
| 49. decomposition | 106. metamorphism | 158. soil | |
| 50. desiccation | 107. metasomatism | 159. sole marking | |
| 51. diatreme | 108. mudcracks | 160. stoping | |
| 52. dike | 109. muscovite | 161. stratification | |
| 53. diorite | | 162. stratovolcano | |
| 54. discontinuous series | | 163. submarine canyon | |
| 55. discordant | | 164. submarine fans | |
| 56. disintegration | | 165. symmetrical ripples | |
| 57. dolostone | | 166. tetrahedron | |

Earth Systems Section 1 Test 1-3

Place all answers on the answer sheet unless otherwise directed.

A. Vocabulary: Identify the term best described by each of the following statements.

- a. This process preserves early-formed igneous minerals by isolating them from remaining magma.
- b. This term means to lift or pick-up and this process converts weathered debris into sediments.
- c. Term indicating that sedimentary rock units were formed in layers.
- d. Generic term for molten material either underground or at the surface.
- e. General name for all non-igneous rock that surround an igneous intrusion.
- f. Name for part of the ocean that floods the continental shelf.
- g. Only near shore waves can produce this feature that may be preserved on a bedding plane.
- h. Type of metamorphism in which rock is exposed to extreme heat pressure and alteration.
- i. General term for igneous bodies that form from magma.
- j. Deep valleys eroded across the continental shelf and slope.
- k. Stage of volcano when cone is highly eroded, but hot gases are continuously released.
- l. Flame structures and pseudonodules begin their formation as these types of sole markings.
- m. Process whereby part of the aureole breaks free and sinks into magma.
- n. Type of volcanic cone composed of alternating layers of lava and loose volcanic debris.
- o. The number of these particles in an atom determine most of its physical and chemical properties.
- p. Term indicating that different types of sediments are deposited simultaneously in different areas.
- q. Process that transports a slurry of sediments from the shelf to the ocean floor.
- r. General name applied to the small crystals in a porphyritic rock.
- s. Term for organisms mixing sediment and destroying the original layering.
- t. General term for the processes that convert loose material into a sedimentary rock.
- u. Eruption that produces a debris laden mass of superheated gas that flows across the ground.
- v. Term to describe all types of plutons which parallel the non-igneous rock layers.
- w. Insufficiently weathered rock debris that can not support rooted plants.
- x. General name for the rock from which a soil develops.
- y. The name of the basic structural unit of the silicate minerals, composed of one silicon atom and four oxygen atoms.
- z. A geode may become this if too much mineral is deposited.
- aa. When fluid lava erupts underwater, these unusual balloon-like structures form.
- bb. The continental rise is composed of these discrete sedimentary accumulations that have merged.
- cc. Name for a long narrow crack in ground from which lava flows out.
- dd. Chemical reaction whereby a material combines with water as in gypsum.
- ee. Systematic fractures that form as some igneous rocks cool and shrink.
- ff. An aureole is an example of this type of metamorphism.
- gg. General term for all solid or liquid volcanic material thrown into the air during an eruption.
- hh. Subatomic part of an atom that has a negative electrical charge.
- ii. This mineral is produced from laterite soils.
- jj. This is another name for the B horizon.
- kk. Extra large depression at the top of a volcano produced as part of the cone collapsed inward.
- ll. Type of volcanic eruption most likely to produce a cinder cone.
- mm. Term that means the size, shape and boundary relationships between minerals in a rock.
- nn. Term for the layering observed in metamorphic rock.
- oo. Textural term for igneous rock which contain hollows formed by escaping gases.
- pp. Name for an aqueous solution enriched in hydrogen ions.
- qq. General term for all of the processes which destroy rocks at the Earth's surface.
- rr. Lava surface most commonly associated with very fluid basaltic lavas.
- ss. Term for cylindrical to tear-drop shaped mass of lava that cools as fall through the air.

- tt. Name for highly decomposed, acid-producing plant material in the O-horizon.
uu. Name for the entire rock portion of the Earth.

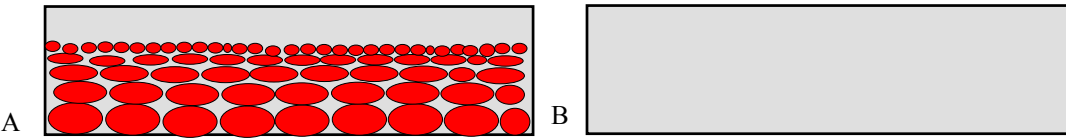
2. Content: True or False. Place a **T** or an **F**, *not the words true or false*, in the blanks.

- a. Once classified as extinct, a volcano can never erupt again.
b. When an acid and a base are mixed together, juvenile water is always created.
c. Although volcanoes form around a vent, fissure may release lava from the sides of the cone.
d. Parent material is the major factor in determining the type of soil that develops in a region.
e. All bedding plane features are produced before the next layer covers the bedding plane.
f. Positive ions are formed when atoms gain extra protons; negative ions form when atoms gain extra electrons.
g. The ocean basin is composed of the continental shelf, slope and rise, the abyssal plains and hills, and the oceanic ridge and trenches.
h. The nucleus of an atom contains protons and neutrons, both of which are positively charged.
i. Aureoles are areas of metamorphism only associated with igneous intrusions.
j. Calderas form when the top of a volcano is blown away in a massive explosion.
k. Rate of chemical weathering is partially controlled by surface area exposed.
l. Magma becomes lava at the Earth's surface and it cools faster and forms smaller crystals.
m. Degree of metamorphism can be determined by the minerals present in the rock.
n. Shield volcanoes erode very slowly where as composite cones erode more rapidly.
o. Metamorphism can be produced by heating, extreme pressure and/or hydrothermal solutions.
p. Differences between pedocals and pedalfers is largely a function of the amount of precipitation.
q. Lava plateaus normally form from basaltic shield volcanoes if too much lava is extruded in one eruption.
r. Tarnishing and rusting are examples of oxidation.
s. The largest volume of material ejected in most volcanic eruptions is water vapor.
t. Some non-foliated rocks may actually be foliated, just as some homogenous rocks may actually be cross bedded.
u. Weight of an atom is the main physical property influenced by the number of neutrons.
v. Quiet eruptions are most commonly associated with gas-poor, extremely hot, mafic lavas.
w. The formation of a new rock requires the destruction of an older rock.
x. Igneous rock texture is mainly controlled by rate of cooling and abundance of gas.
y. As water freezes to become ice, it contracts and pulls rocks apart.
z. Stratification forms before lithification, but foliation forms during metamorphism.
aa. The continental rise is the largest mass of sediments in the ocean basin.
bb. Nodules begin their existence as geodes, become vugs and expand to form nodules.
cc. The Earth is a closed system.
dd. During metamorphism pore space increases because water is converted into bubbles of steam.
ee. A mineral's physical and chemical properties are determined by the atoms present and their arrangement.
ff. All country rock is sedimentary unless metamorphosed by igneous intrusions.
gg. As temperature increases, rate of chemical weathering increases if liquid water is present.
hh. Extremely hot, gas-rich felsic lavas can be very fluid and produce poehoe lavas.
ii. Snow is a mineral.
jj. In a pedalfer, humic acids cause aluminum, iron and clay to be transported from the A to the B horizon and calcium and magnesium to be washed away in the ground water.
kk. Silicates are the most abundant and complex group of minerals.
ll. Both nodules and pseudonodules have a different composition than the rock enclosing them.
mm. Ground water recycled in volcanic eruptions is called juvenile water.
nn. Basalt plateaus only become visible when exposed by erosion.

- oo. During metamorphism, part of the original rock melts and recrystallizes.
- pp. Over time, the composition of lava erupted from a volcano should change from felsic to mafic.
- qq. Muscovite should be more resistant to chemical weathering than Sodium plagioclase.
- rr. Aa lavas all have a felsic composition.
- ss. The force behind magma migration is largely caused by the expansion of material as it melts.
- tt. Atoms in chemical compounds share electrons.
- uu. Physical weathering breaks rocks into smaller pieces and increases total surface area.
- vv. Resistance of rocks to weathering is a function of the environment in which they are located.
- ww. The change in mineral composition in the discontinuous series reflects the increasingly complex arrangements of silica tetrahedrons.
- xx. All sediments must be cemented in order to be converted into a sedimentary rock.

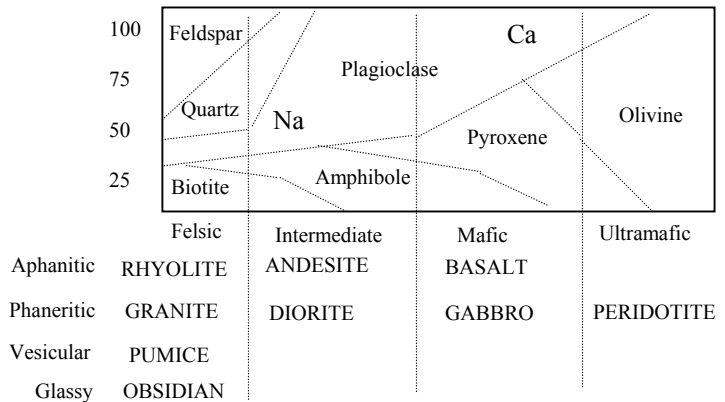
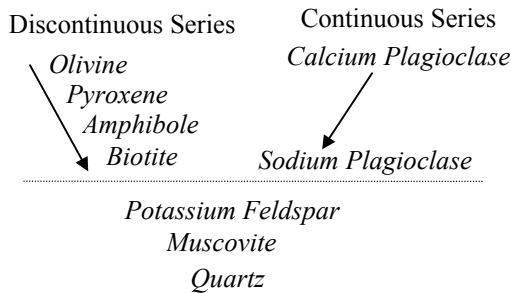
Diagrams and Graphs

3. Using the terms in the word bank, identify the type of bedding illustrated below.



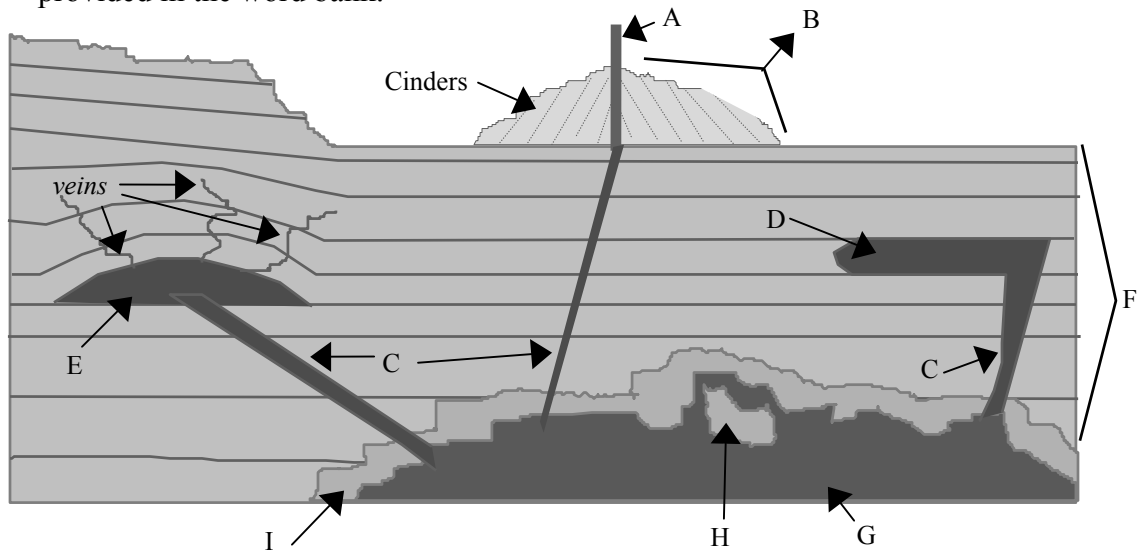
4. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated below. Use the word bank to answer the following questions.

- 4a. A piece of granite is placed into a container and slowly heated. What will be the first mineral within the granite to melt?
- 4b. A piece of gabbro is placed into a container and is slowly heated. What will be the last mineral within the gabbro to melt?
- 4c. A piece of granite is melted completely and the melt is cooled instantaneously in ice water. What igneous rock will likely be produced?
- 4d. A piece of basalt is placed outdoors and allowed to weather. What will be the first mineral likely to show signs of chemical weathering?
- 4e. What type of igneous rock will be the first to form as magma slowly cooled?
- 4f. Pieces of granite, diorite gabbro and peridotite are placed outside. Which rock is likely to take the longest to physically and chemically weather and produce a soil?



1

5. Identify the features and igneous bodies illustrated on the cross section below. Use the terms provided in the word bank.



Answer Sheet.

1. Place the **number** corresponding to the correct term from the word bank into the blank.

- | | | | | |
|----------|----------|-----------|-----------|-----------|
| a. 78__ | k. 3__ | u. 89__ | ee. 26__ | oo. 138__ |
| b. 43__ | l. 75__ | v. 29__ | ff. 31__ | pp. 2__ |
| c. 125__ | m. 124__ | w. 112__ | gg. 107__ | qq. 141__ |
| d. 79__ | n. 126__ | x. 93/112 | hh. 41__ | rr. 101__ |
| e. 32__ | o. 104__ | y. 131__ | ii. 12__ | ss. 16__ |
| f. 96__ | p. 46__ | z. 140__ | jj. 129__ | tt. 59__ |
| g. 130__ | q. 136__ | aa. 99__ | kk. 20__ | uu. 52__ |
| h. 57__ | r. 56__ | bb. 128__ | ll. 44__ | |
| i. 100__ | s. 14__ | cc. 48__ | mm. 132__ | |
| j. 127__ | t. 73__ | dd. 60__ | nn. 49__ | |

2. Place a T in the blanks of true statements, Leave other blanks empty

- | | | | | |
|-----------|-----------|------------|------------|------------|
| a. _____ | k. T_____ | u. T_____ | ee. T_____ | oo. _____ |
| b. _____ | l. T_____ | v. T_____ | ff. _____ | pp. _____ |
| c. T_____ | m. T_____ | w. T_____ | gg. T_____ | qq. T_____ |
| d. _____ | n. T_____ | x. T_____ | hh. T_____ | rr. _____ |
| e. _____ | o. T_____ | y. _____ | ii. T_____ | ss. T_____ |
| f. _____ | p. T_____ | z. T_____ | jj. T_____ | tt. T_____ |
| g. _____ | q. _____ | aa. T_____ | kk. T_____ | uu. T_____ |
| h. _____ | r. T_____ | bb. _____ | ll. T_____ | vv. T_____ |
| i. _____ | s. OMIT_ | cc. _____ | mm. _____ | ww. T_____ |
| j. _____ | t. T_____ | dd. _____ | nn. _____ | xx. _____ |

3, 4 and 5. Place the **number** for the correct term from the word bank into the blank

- | | | | | |
|-----------|-----------|-----------|-----------|-------------|
| 3a. 54___ | 4b. 91___ | 4f. 55___ | 5C. 36___ | 5G. 11___ |
| 3b. 58___ | 4c. 90___ | | 5D. 120__ | 5H. 142/124 |
| | 4d. 91___ | 5A. 35___ | 5E. 68___ | 5I. .8_____ |
| 4a. 109__ | 4e. 97___ | 5B. 25___ | 5F. 32___ | |

- A**
1. aa
 2. acid
 3. active volcano
 4. amphibole
 5. andesite
 6. ash
 7. atoms
 8. aureole
- B**
9. basalt
 10. base
 11. batholith
 12. bauxite
 13. biotite
 14. bioturbation
 15. blocks
 16. bombs
- C**
17. Ca plagioclase
 18. caliche
 19. carbonation
 20. cauldера
 21. cementation
 22. chemical compounds
 23. chemical weathering
 24. cinder
 25. cinder cone
 26. columnar jointing
 27. compaction
 28. composition
 29. concordant
 30. concretion
 31. contact metamorphism
 32. country rock
 33. cross bedded
 34. current ripples
- D**
35. diatreme
 36. dike
 37. diorite
 38. discordant
 39. dormant volcano
40. dust
- E**
41. electrons
 42. epicontinental sea
 43. erosion
 44. explosive eruption
 45. extinct volcano
- F**
46. facies
 47. felsic
 48. fissure
 49. foliated
- G**
50. gabbro
 51. geode
 52. geolithosphere
 53. glassy
 54. graded bedded
 55. granite
 56. groundmass
- H**
57. high grade metamorphism
 58. homogenous bedding
 59. humus
 60. hydration
 61. hydrogen ion
 62. hydrosphere
 63. hydrothermal fluids
- I/J/K**
64. intermediate eruption
 65. juvenile water
 66. K feldspar
 67. kimberlite
- L**
68. laccolith
 69. lapilli
 70. laterite
 71. lava
 72. lava dome
73. lithification
74. litter
75. load cast
76. low grade metamorphism
- M**
77. magma
 78. magmatic differentiation
 79. melt
 80. metaconglomerate
 81. metamorphism
 82. mudcracks
 83. muscovite
- N**
84. Na plagioclase
 85. neutrons
 86. nodules
 87. non-foliated
 88. nucleus
 89. nueé ardente
- O**
90. obsidian
 91. olivine
 92. oxidation
- P**
93. parent material
 94. pedalfer
 95. pedocal
 96. pericontinental sea
 97. peridotite
 98. phenocryst
 99. pillow lava
 100. pluton
 101. poehoehoe
 102. pore space
 103. porphyritic
 104. proton
 105. pseudonodules
 106. pumice
 107. pyroclastic debris
 108. pyroxene
- Q**
109. quartz
 110. quiet eruption
- R**
111. regional metamorphism
 112. regolith
 113. relict structure
 114. rhyolite
 115. rock cycle
 116. rock gypsum
- S**
117. sediments
 118. shield volcano
 119. silicates
 120. sill
 121. slate
 122. soil horizons
 123. sole marking
 124. stoping
 125. stratification
 126. stratovolcano
 127. submarine canyon
 128. submarine fans
 129. subsoil
 130. symmetrical ripples
- T**
131. tetrahedron
 132. texture
 133. thin-bedded
 134. tool marks
 135. top soil
 136. turbidity current
- V/W/X**
137. vent
 138. vesicular
 139. volcano
 140. vug
 141. weathering
 142. xenolith

Earth Systems Section 1 Test 1-4

Place all answers on the answer sheet unless otherwise directed.

A. Vocabulary: Identify the term best described by each of the following statements.

Place the number associated with the word into the corresponding blank.

1. General term for all rocks containing feldspar, muscovite and quartz.
2. Volcanic cone type that is the largest in size and volume of material.
3. In place weathering products which can not support plant growth.
4. When some magmas cool and contract, pillar-like structures form if these partings develop.
5. Bright red soil that can develop into bauxite.
6. Process that transports massive amounts of sediments from the seas to the ocean floor.
7. General term for all atoms with the same number of protons.
8. General name for the rocks or sediments from which a soil forms.
9. Small openings between grains in some clastic rocks.
10. A pericontinental sea overlies this part of the continent.
11. Process whereby early formed crystals in a pluton sink and are preserved.
12. Small scale metamorphism associated with intrusions and faults.
13. General name for the small crystals in a porphyritic rock.
14. Rounded mass of sediment that sinks into and is preserved within an underlying layer of clay.
15. Degree of metamorphism caused by extreme heat, pressure and hydrothermal solution.
16. Term for *compositional* changes that occur to a rocks when exposed at Earth's surface.
17. Without this dark fibrous material at the soil surface pedalfers do not develop.
18. Dissolution of limestone in rainwater is an example of this type of chemical reaction.
19. Well-cemented, spherical mass of sand within a sandstone layer.
20. Particle in an atom with a negative electrical charge.
21. This term means to lift particles.
22. Lava structures produced when fluid basalt erupts on the sea floor.
23. Term for layering in metamorphic rocks.
24. Term to describe the size, shape and boundary relationships of particles in rocks.
25. Phenomenon whereby organisms mix sediment and produces homogenous bedding.
26. Name for valleys eroded across the continental slope.
27. Volcanic structure formed by the collapse of the top of the volcanic cone.
28. Any evidence of past life found in a rock.
29. Name for preserved stopped blocks of country rock in a pluton.
30. General term for the layering observed in sedimentary rocks.
31. Some of these features develop into flame structures and pseudonodules.
32. Crystal-lined hollow cavity in a rock.
33. Compositional lava type most likely to produce an aa lava surface.
34. These structures merge and form the continental rise.
35. Body of altered rock found adjacent to faults and intrusions.
36. Name of the most abundant and diverse of the mineral groups.
37. Name for the rocky inclination that extends down from the shelf to the ocean floor.
38. In a pedalfer this soil horizon is enriched in iron, aluminum and clay, but poor in organic.
39. Name of the rock that is commonly associated with diamonds.
40. General term for air-borne volcanic material violently ejected in an eruption.
41. Aqueous solution enriched in hydroxyl ions (OH⁻).
42. Deposit of white powdery calcite on the soil surface in very arid environments.
43. Most common texture of the plutonic rocks.
44. Rock produced by metamorphosing limestone or chalk.
45. Only sills and laccoliths are placed into this group of plutons.

46. General term for molten rock wherever it is located.
47. Term for the type of eruption in which fluid lava gently flow out of a fissure.

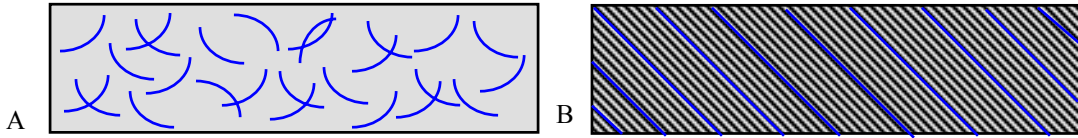
B. Content: Place a **T** in the blank of all true statement, leave other blanks empty.

1. In Bowen's reaction series biotite becomes muscovite and Na-Plagioclase becomes feldspar.
2. In a pedocal evaporative pumping pulls calcite crystals to the surface of the ground.
3. The gas cloud in a nuee ardente eruption is loaded with pyroclastic debris.
4. In clay-rich soils, cementation is not necessary for lithification.
5. Aa type lava is only formed from felsic lavas and poehoehoe lavas are only mafic.
6. Chemical weathering only occurs on surfaces of a rock. This includes cracks.
7. Most phenocrysts begin as xenoliths.
8. Explosive eruptions are mainly associated with viscous, gas-rich felsic and intermediate lavas.
9. Metamorphism normally occurs at the Earth's surface.
10. All atoms contain protons and electrons.
11. Lava fluidity is a function of composition, temperature and gas content.
12. Pore space is usually eliminated during metamorphism.
13. Cinder cones are the tallest volcanoes because pyroclastic debris is thrown high into the air.
14. Water is essential for most forms of chemical weathering.
15. The silica tetrahedron is the basic component of minerals in the discontinuous series.
16. Frost action breaks rocks because water expands as it becomes ice.
17. Part of the upward migration of magma is cause by the expansion of material as it melts.
18. Climate is the most important factor in determining the type of soil that develops.
19. Deposition in pericontinental seas is more permanent than on land or epicontinental seas.
20. The number of protons in an atom determine most of its physical and chemical properties.
21. Mudcracks can form underwater.
22. Extinct volcanoes can never erupt again.
23. Metamorphism generally alters rocks but not the minerals composing them.
24. The first minerals to form in Bowen's reaction series have the lowest melting point.
25. Sole markings form on the top of a bed but are preserved on the bottom of the overlying bed.
26. Concordant plutons are all horizontal and parallel to the Earth's surface.
27. The continental slope is a steep incline from the shelf to the ocean floor.
28. Flame structures form from load casts and may become pseudonodules.
29. Before molten rock can be lava it must first be magma.
30. Mineral stability determines which minerals remain to form a soil.
31. For a new rock to be formed an existing rock must be destroyed or have been destroyed.
32. Composition of a melt gradually alters as the melt cools and minerals crystallize.
33. Mafic lavas are generally more fluid than felsic.
34. Geodes form from nodules.
35. Submarine canyons are gradually enlarged by turbidity current.
36. In chemical compounds atoms share electrons, but not protons or neutrons.
37. The colour of light coloured grains are more easily altered by staining than dark grains.
38. Plutons only become visible when exposed by erosion.
39. When rocks break, rock volume and surface area increase, but particle size decreases.
40. Acids attack minerals such as calcite and dolomite, but not quartz.
41. Plutonic rocks are generally not vesicular.
42. All minerals are chemical compounds.
43. Symmetrical ripple marks are only produced by waves.
44. Pyroxene can not form until after olivine has formed.
45. The major gas released in volcanic eruptions is carbon dioxide.

46. Snow would be classified as a mineral, but rain would not.

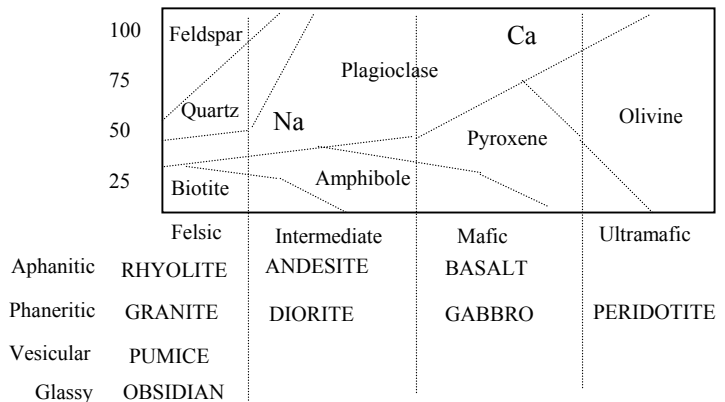
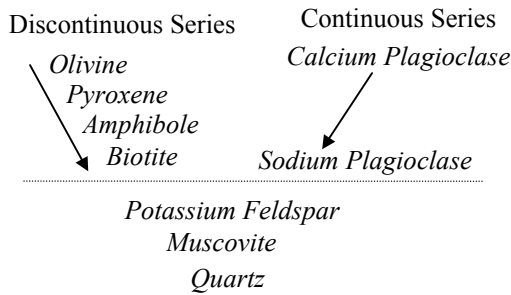
Diagrams and Graphs

C. Using the terms in the word bank, identify the type of bedding illustrated below.

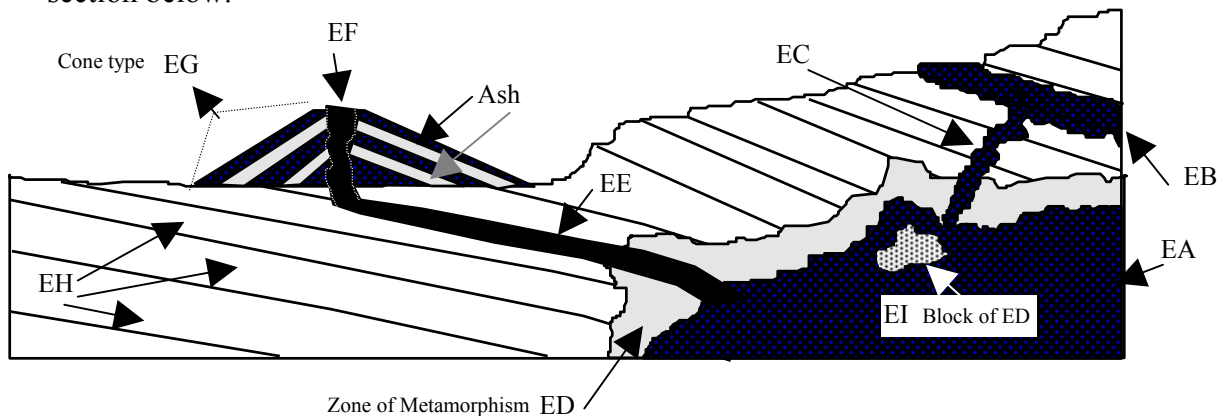


D. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated below. Use the word bank to answer the following questions.

- D1. A piece of peridotite is placed into a container and slowly heated. What will be the first mineral of the discontinuous series within the peridotite to melt?
- D2. A piece of granite is placed into a container and is slowly heated. What will be the last mineral from the discontinuous series within the granite to melt?
- D3. A piece of basalt is melted completely and the melt is cooled rapidly. What igneous rock will likely be produced?
- D4. A piece of basalt is placed outdoors and allowed to weather. What will be the first mineral likely to show signs of chemical weathering?
- D5. What type of igneous rock will be the last to form as magma slowly cools?
- D6. Pieces of granite, diorite, gabbro and peridotite are place outside. Which rock will physically and chemically weather the fastest?



E. Use the word bank to identify the features and igneous bodies illustrated on the cross section below.



Answer Sheet.

A. Place the **number** of the correct term from the word bank into the blank.

- | | | | | |
|-----------|-----------|------------|------------|-----------|
| 1. 34___ | 11. 59___ | 21. 33___ | 31. 55___ | 41. 8___ |
| 2. 93___ | 12. 6/21_ | 22. 78___ | 32. 39___ | 42. 13___ |
| 3. 90___ | 13. 44___ | 23. 37___ | 33. 34/91 | 43. 75___ |
| 4. 18___ | 14. 83___ | 24. 103___ | 34. 101___ | 44. 60___ |
| 5. 51___ | 15. 45___ | 25. 11___ | 35. 6___ | 45. 19___ |
| 6. 105___ | 16. 16___ | 26. 100___ | 36. 94___ | 46. 61___ |
| 7. 32___ | 17. 47___ | 27. 15___ | 37. 23___ | 47. 36___ |
| 8. 71___ | 18. 14___ | 28. 35___ | 38. 102___ | |
| 9. 80___ | 19. 20___ | 29. 108___ | 39. 49___ | |
| 10. 22___ | 20. 31___ | 30. 98___ | 40. 85___ | |

B. Place a **T** in the blanks of true statements, *Leave other blanks empty.*

- | | | | | |
|----------|-----------|-----------|-----------|-----------|
| 1. _____ | 11. T___ | 21. _____ | 31. T___ | 41. T___ |
| 2. _____ | 12. T___ | 22. _____ | 32. T___ | 42. _____ |
| 3. T___ | 13. _____ | 23. _____ | 33. T___ | 43. T___ |
| 4. T___ | 14. T___ | 24. _____ | 34. _____ | 44. T___ |
| 5. _____ | 15. T___ | 25. T___ | 35. T___ | 45. _____ |
| 6. T___ | 16. T___ | 26. _____ | 36. T___ | 46. T___ |
| 7. _____ | 17. T___ | 27. _____ | 37. T___ | |
| 8. T___ | 18. T___ | 28. T___ | 38. T___ | |
| 9. _____ | 19. _____ | 29. T___ | 39. _____ | |
| 10. T___ | 20. T___ | 30. T___ | 40. T___ | |

C, D and E. Place the **number** for the correct term from the word bank into the blank

Ca. 46 ___ D2. 3 ___ D6. 74 ___ EC. 28 ___ EG. 99 ___
 Cb. 26 ___ D3. 7 ___ ED. 6 ___ EH. 25 ___
 D4. 69/12 EA. 9 ___ EE. 95 ___ EI. .108/97
 D1. 86 ___ D5. 43 ___ EB. 95 ___ EF. 27 ___

- | | | | |
|--|---|--|--|
| <p>A</p> <p>1. aa</p> <p>2. acid</p> <p>3. amphibole</p> <p>4. andesite</p> <p>5. atoms</p> <p>6. aureole</p>
<p>B</p> <p>7. basalt</p> <p>8. base</p> <p>9. batholith</p> <p>10. biotite</p> <p>11. bioturbation</p>
<p>C</p> <p>12. Ca plagioclase</p> <p>13. caliche</p> <p>14. carbonation</p> <p>15. cauldery</p> <p>16. chemical weathering</p> <p>17. cinder cone</p> <p>18. columnar jointing</p> <p>19. concordant</p> <p>20. concretion</p> <p>21. contact metamorphism</p> <p>22. continental shelf</p> <p>23. continental slope</p> <p>24. continental rise</p> <p>25. country rock</p> <p>26. cross bedded</p>
<p>D</p> <p>27. diatreme</p> <p>28. dike</p> <p>29. diorite</p> <p>30. discordant</p>
<p>E</p> <p>31. electron</p> <p>32. element</p> | <p>33. erosion</p>
<p>F</p> <p>34. felsic</p> <p>35. fossil</p> <p>36. fissure flow</p> <p>37. foliation</p>
<p>G</p> <p>38. gabbro</p> <p>39. geode</p> <p>40. glassy</p> <p>41. gneiss</p> <p>42. graded bedded</p> <p>43. granite</p> <p>44. groundmass</p>
<p>H</p> <p>45. high grade metamorphism</p> <p>46. homogenous bedding</p> <p>47. humus</p>
<p>I/J/K</p> <p>48. K feldspar</p> <p>49. kimberlite</p>
<p>L</p> <p>50. laccolith</p> <p>51. laterite</p> <p>52. lava</p> <p>53. lava dome</p> <p>54. litter</p> <p>55. load cast</p> <p>56. low grade metamorphism</p>
<p>M</p> <p>57. mafic</p> <p>58. magma</p> | <p>59. magmatic differentiation</p> <p>60. marble</p> <p>61. melt</p> <p>62. mudcracks</p> <p>63. muscovite</p>
<p>N</p> <p>64. Na plagioclase</p> <p>65. neutrons</p> <p>66. nodules</p> <p>67. nuee ardente</p>
<p>O</p> <p>68. obsidian</p> <p>69. olivine</p> <p>70. oxidation</p>
<p>P</p> <p>71. parent material</p> <p>72. pedalfers</p> <p>73. pedocal</p> <p>74. peridotite</p> <p>75. phaneritic</p> <p>76. phenocryst</p> <p>77. physical weathering</p> <p>78. pillow lava</p> <p>79. poehoe</p> <p>80. pore space</p> <p>81. porphyritic</p> <p>82. proton</p> <p>83. pseudonodule</p> <p>84. pumice</p> <p>85. pyroclastic debris</p> <p>86. pyroxene</p>
<p>Q/R</p> <p>87. quartz</p> <p>88. quartzite</p> <p>89. regional metamorphism</p> <p>90. regolith</p> | <p>91. rhyolite</p>
<p>S</p> <p>92. sediments</p> <p>93. shield volcano</p> <p>94. silicates</p> <p>95. sill</p> <p>96. soil</p> <p>97. stoping</p> <p>98. stratification</p> <p>99. stratovolcano</p> <p>100. submarine canyon</p> <p>101. submarine fans</p> <p>102. subsoil</p>
<p>T</p> <p>103. texture</p> <p>104. top soil</p> <p>105. turbidity current</p>
<p>V/W/X</p> <p>106. vesicular</p> <p>107. vug</p> <p>108. xenolith</p> |
|--|---|--|--|

Earth Systems Section 1 Test 1-5

Place all answers on the answer sheet unless otherwise directed.

A. Vocabulary: Identify the term best described by each of the following statements. Place the number associated with the word into the corresponding blank.

1. The term for the size, shape, and boundary relationships between particles in a rock.
2. All weathered material that is eroded.
3. Process whereby organisms realign the original orientation and distribution of sediments.
4. Alteration of pre-existing rock by heat, pressure and hydrothermal solutions.
5. This part of the nucleus adds weight but does not determine the other properties of the atom.
6. A geode becomes this if the growing crystals completely fill the opening.
7. Process whereby blocks of country rock break free and sink into magma.
8. Metamorphic form of coal.
9. Portion of a soil horizon depleted in aluminum, clay and iron and enriched in organic matter.
10. Term for molten material that is underground.
11. Bedding plane feature produced only by waves near the sea shore.
12. Term for the layering of sedimentary rocks.
13. Term for the marine body of water that floods the interior of a continent.
14. All atoms with the same number of protons compose this grouping.
15. Decomposing plant material that can still be identified as to source.
16. Zone of alteration surrounding an igneous intrusion.
17. Inactive, but highly eroded volcano is termed this.
18. Layering within metamorphic rocks is called this.
19. Through this process rocks consisting of only olivine may be formed.
20. General term for features formed on the top of a bed, but preserved on the underside of the overlying bed.
21. General term for all igneous material, regardless of size, thrown into the air during an eruption.
22. Process whereby massive amounts of sediments are periodically transported to the ocean floor.
23. Large depression formed by the collapse of a portion or all of a volcanic cone.
24. Soil type that can form caliche under extreme conditions.
25. General term for material formed when two or more different types of atoms chemically combine.
26. Metamorphosed limestone or dolostone is this type of metamorphic rock.
27. Term for igneous bodies that do not cut across layers of country rock.
28. Lens-shape mass formed by material from the overlying bed sinking into the bed below.
29. Largest of all volcanic cones and consisting of mainly lava flows.
30. Aluminum-rich soil that can be transformed into bauxite.
31. Igneous texture formed by the cooling of magma.
32. This group of igneous bodies is only visible after being exposed by erosion.
33. Opening in the ground about which a volcano accumulates.
34. Inclusive term for all of the processes that convert loose particles into a sedimentary rock.
35. Produced when atoms arrange themselves in an orderly pattern based upon electrical attraction and repulsion.
36. Aqueous solution enriched in hydroxyl ions.
37. Lava type in which the surface is smooth and rolling to billowy.
38. The continental rise is composed of these sedimentary masses that have merged.
39. Cloud of dense superheated gas and ash that flows across the landscape after being erupted.
40. Basic structure of silicate minerals; pyramid in shape.
41. Growth of minerals in pore spaces between grains that binds the grains together.
42. Partially decomposed rock debris that has not been eroded and can not support rooted plants.

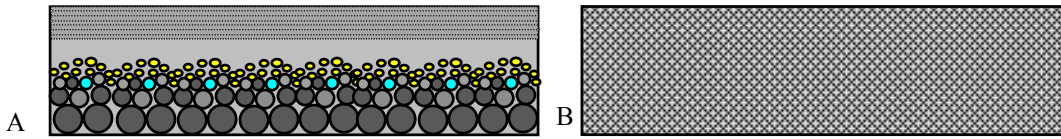
43. Igneous texture consisting of both large and small crystals.
44. Lava structures formed where a mafic lava erupts under water.
45. Geology is the study of this part of the Earth system.

B. Content: Place a **T** in the blank of all true statement, leave other blanks empty.

1. Texture of igneous rocks is determined by rate of cooling, location of cooling and composition.
2. Physical weathering increases surface area and rock volume, but does not alter mineral content.
3. All bedding plane features form at the time the sediments are deposited.
4. Xenoliths are usually metamorphic rock.
5. Explosive eruptions are more commonly associated with felsic melts than mafic melts.
6. In laterites calcium, magnesium and silica are dissolved and washed out of the soil.
7. Silicates are the most diverse group of minerals.
8. Turbidity currents both transport and erode sediments as they flow.
9. As temperature rises, the rate of chemical weathering declines because of greater evaporation.
10. Grade of metamorphism is related to the amount of mineral and rock alteration.
11. Steam is the most abundant material released by volcanoes.
12. Fissure flows are more likely associated with mafic lavas and lava domes with felsic melts.
13. The term "erosion" includes the concept of both lifting grains or dissolving them.
14. Magma migrates because rock material expands as it melts.
15. Different minerals become chemically unstable under different environmental conditions.
16. Only metamorphosed sedimentary rocks display foliation.
17. Fluidity of lava is a function of composition, temperature and gas content.
18. Composition of a melt typically changes over time.
19. Sediments must be cemented to become a sedimentary rock.
20. Rusting and tarnishing are a form of oxidation that produces new minerals.
21. Deep submarine canyons were formed as river valleys and later flooded as sea level rose.
22. Volcanic glass is a mineral and a rock.
23. Extremely high grade metamorphism can alter any rock into gneiss.
24. Most of the water released in a volcanic eruption is juvenile water.
25. Diatremes are concordant and discordant, but other igneous bodies are either one or the other.
26. Flame structures mainly occur in molten felsic rocks.
27. Parent material is the most important factor in determining the type of soil that can develop.
28. Only sedimentary rocks display any type of layering.
29. At the same temperature, mafic lavas should be more fluid than felsic lavas.
30. Many of the minerals in a metamorphic rock melted during metamorphism.
31. All minerals are chemical compounds.
32. Nodules, pseudonodules and concretions were all formed after the sediments containing them were lithified.
33. Pedalfer soils tend to be acidic and this causes the solution of calcium and magnesium minerals.
34. Sedimentary rocks are likely to be before being melted by magma..
35. Columnar jointing and mudcracks both result from shrinkage.
36. Heat and pressure make a rock more pliable and chemically reactive.
37. The C horizon in a soil is essentially regolith.
38. Relict structures are only found in association with homogenous bedding.
39. Sediments are likely to be undisturbed for the longest time is in an epicontinental sea.
40. The number of electrons in an atom determines all of its chemical properties.
41. Felsic lavas would be more likely to have an aa surface than would a mafic lava

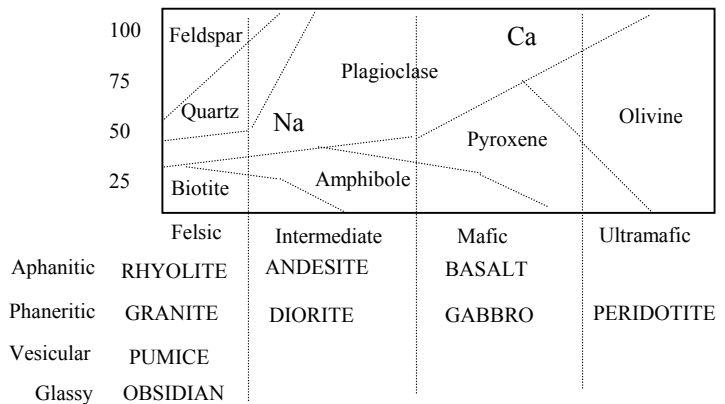
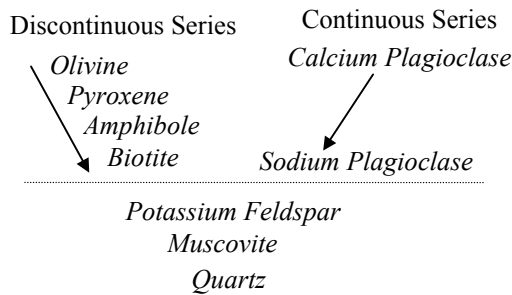
Diagrams and Graphs

C. Using the terms in the word bank, identify the type of bedding illustrated below.

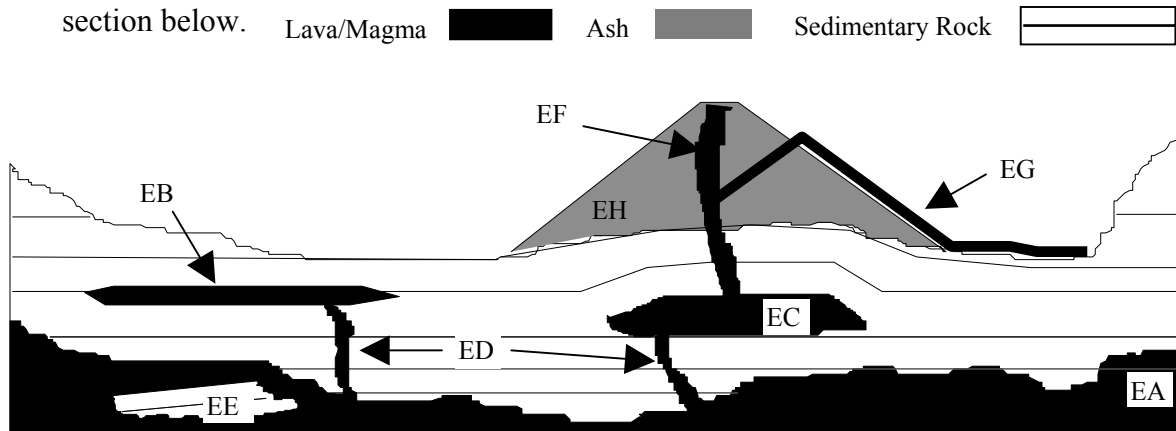


D. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated below. *Use the word bank to answer the following questions.*

- D1.** A piece of peridotite is placed outdoors and allowed to weather. What will be the first mineral to weather? **D2** What will be the last to weather?
- D3.** As magma cools, what will be the first type of igneous rock likely to form? **D4** What will be the last?
- D5.** A piece of obsidian is melted completely and the melt is cooled very slowly. What igneous rock will likely be produced?
- D6.** A piece of granite is placed outdoors and allowed to weather. What will be the last mineral likely to show signs of chemical weathering? **D7.** What will be the first mineral?
- D8.** Pieces of granite, diorite, gabbro and peridotite are placed into an chamber and slowly heated. Which rock will completely melt first?
- D9.** Pieces of granite, diorite, gabbro and peridotite are place outside. Which rock will physically and chemically weather the slowest?



E. Use the word bank to identify the features and igneous bodies illustrated on the cross section below.



Answer Sheet.

A. Place the **number** of the correct term from the word bank into the blank.

- | | | | | |
|-----------|----------|-----------|-----------|-----------|
| 1. 100__ | 11. 98__ | 21. 82__ | 31. 72__ | 41. 19/20 |
| 2. 88__ | 12. 94__ | 22. 101__ | 32. 75__ | 42. 86__ |
| 3. 16__ | 13. 35__ | 23. 18__ | 33. 102__ | 43. 78__ |
| 4. 59__ | 14. 34__ | 24. 69__ | 34. 53__ | 44. 74__ |
| 5. 62__ | 15. 52__ | 25. 21__ | 35. 27__ | 45. 41__ |
| 6. 104__ | 16. 10__ | 26. 57__ | 36. 13__ | |
| 7. 93__ | 17. 32__ | 27. 23__ | 37. 76__ | |
| 8. 7__ | 18. 39__ | 28. 80__ | 38. 97__ | |
| 9. 1__ | 19. 56__ | 29. 89__ | 39. 64__ | |
| 10. 55/58 | 20. 92__ | 30. 49__ | 40. 99__ | |

B. Place a **T** in the blanks of true statements, *Leave other blanks empty.*

- | | | | | |
|------------|------------|------------|------------|------------|
| 1. _____ | 11. T_____ | 21. _____ | 31. _____ | 41. T_____ |
| 2. _____ | 12. T_____ | 22. _____ | 32. _____ | |
| 3. _____ | 13. T_____ | 23. _____ | 33. T_____ | |
| 4. T_____ | 14. T_____ | 24. _____ | 34. OMIT | |
| 5. T_____ | 15. T_____ | 25. _____ | 35. T_____ | |
| 6. T_____ | 16. _____ | 26. _____ | 36. T_____ | |
| 7. T_____ | 17. T_____ | 27. _____ | 37. T_____ | |
| 8. T_____ | 18. T_____ | 28. _____ | 38. T_____ | |
| 9. _____ | 19. _____ | 29. T_____ | 39. T_____ | |
| 10. T_____ | 20. T_____ | 30. _____ | 40. _____ | |

C, D and E. Place the **number** for the correct term from the word bank into the blank

Ca. 42___ D3. 71___ D7 5/15___ EB. 90___ EF. 28___
 Cb. 44___ D4. 43___ D8 43___ EC. 48___ EG. 38/50
 D1. 66___ D5. 43___ D9 43___ ED. 29___ EH. 22___
 D2. 83___ D6. 84___ EA. 14___ EE. 25/105/93

- | | | | |
|---|---|---|---|
| <p>A</p> <ol style="list-style-type: none"> 1. A-horizon 2. aa 3. acid 4. active 5. amphibole 6. andesite 7. anthracite 8. aphanitic 9. asymmetrical ripplemark 10. aureole <p>B</p> <ol style="list-style-type: none"> 11. B-horizon 12. basalt 13. base 14. batholith 15. biotite 16. bioturbation <p>C</p> <ol style="list-style-type: none"> 17. C-horizon 18. cauldrea 19. cement 20. cementation 21. chemical compound 22. cinder cone 23. concordant 24. concretion 25. country rock 26. cross bedded 27. crystal structure <p>D</p> <ol style="list-style-type: none"> 28. diatreme 29. dike 30. diorite 31. discordant 32. dormant <p>E</p> | <ol style="list-style-type: none"> 33. electron 34. element 35. epicontinental sea <p>F</p> <ol style="list-style-type: none"> 36. felsic 37. fissure 38. fissure flow 39. foliation <p>G</p> <ol style="list-style-type: none"> 40. gabbro 41. geolithosphere 42. graded bedded 43. granite <p>H</p> <ol style="list-style-type: none"> 44. homogenous bedding 45. humus <p>I/J/K</p> <ol style="list-style-type: none"> 46. K feldspar 47. kimberlite <p>L</p> <ol style="list-style-type: none"> 48. laccolith 49. laterite 50. lava 51. lava dome 52. litter 53. lithification <p>M</p> <ol style="list-style-type: none"> 54. mafic 55. magma 56. magmatic differentiation 57. marble 58. melt 59. metamorphism | <ol style="list-style-type: none"> 60. mudcracks 61. muscovite <p>N</p> <ol style="list-style-type: none"> 62. neutrons 63. nodules 64. nueé ardente <p>O</p> <ol style="list-style-type: none"> 65. obsidian 66. olivine 67. oxidation <p>P</p> <ol style="list-style-type: none"> 68. pedalfer 69. pedocal 70. pericontinental sea 71. peridotite 72. phaneritic 73. phenocryst 74. pillow lava 75. pluton 76. poehoehoe 77. pore space 78. porphyritic 79. proton 80. pseudonodule 81. pumice 82. pyroclastic debris 83. pyroxene <p>Q/R</p> <ol style="list-style-type: none"> 84. quartz 85. quartzite 86. regolith 87. rhyolite <p>S</p> <ol style="list-style-type: none"> 88. sediments 89. shield volcano 90. sill 91. soil 92. sole marking | <ol style="list-style-type: none"> 93. stoping 94. stratification 95. stratovolcano 96. submarine canyon 97. submarine fans 98. symmetrical ripplemark <p>T</p> <ol style="list-style-type: none"> 99. tetrahedron 100. texture 101. turbidity current <p>V/W/X</p> <ol style="list-style-type: none"> 102. vent 103. vesicular 104. vug 105. xenolith |
|---|---|---|---|

Earth Systems Section 1 Test 1 - 6

Place all answers on the answer sheet unless otherwise directed.

A. Vocabulary: Identify the term in the Word Bank that is best described by each of the following statements.

1. Term that indicates a melt is located underground.
2. Process in which early-formed crystals settle to the bottom of a magma chamber and are preserved.
3. Ultramafic iron-magnesium-rich igneous rock that is commonly associated with diamonds.
4. Metamorphosed area adjacent to an igneous intrusion.
5. Soil type with a thick O horizon and well developed A and B horizon.
6. Weathering process whereby large rocks break into smaller pieces with no change in composition.
7. Lava type with a smooth, ropy, billowy surface.
8. Laterites may eventually be altered to become this aluminum-rich mineral.
9. Basic structural unit from which silicates are constructed.
10. Ripple type that is only produced by waves.
11. Term for the overall process whereby loose sediments are converted into sedimentary rocks.
12. Term for highly decomposed organic material concentrated in the O horizon.
13. General term for features preserved on the bottom of a bed.
14. General term for layering within metamorphic rocks.
15. General compositional term for an igneous rock rich in feldspar, quartz and sodium plagioclase.
16. Aqueous solution enriched in hydrogen ions.
17. General term for all intrusive igneous bodies which cut across adjacent rock layers.
18. Load casts can form these structures if they break free and sink into the underlying layer.
19. Volcano that is releasing steam is said to be in this stage of existence.
20. Term for all atoms with the same atomic number.
21. Specific term for an outflow of lava from a fissure **on the side of a volcano**.
22. Term for open spaces between the grains in sediments or sedimentary rocks.
23. Low grade metamorphosing of shale produces this type of rock.
24. Dust, ash, cinders, lapilli are part of this class of igneous material ejected from the Earth.
25. General term for any material that is eroded.
26. Crystal lined cavity within a rock.
27. Term for the size, shape and boundary relationships between grains.
28. Deposit of calcium carbonate that forms at the top of some pedocals in very arid environments.
29. Volcanic cone type with alternating layers of lava and ash.
30. Bases are enriched with this type of ion composed of hydrogen and oxygen.
31. General term for igneous rock bodies that form underground.
32. Different types of sediment are deposited in different areas at the same time.
33. Gaseous envelope that surrounds the Earth.
34. Sea that floods the edge of a continent.
35. Large depression cause by the collapse of the top of a volcanic cone.
36. High grade metamorphism of peat will eventually produce this type of metamorphic rock.
37. Water that has never existed before and is therefore new.
38. Sedimentary rock composed of randomly oriented particles of clay.
39. Phenomenon which transfers massive amounts of sediment mixed with water into the deep ocean.
40. Most basic unit of matter with distinct physical and chemical properties.
41. Term for weathered rock debris which can not support rooted plants.
42. Process whereby organisms mix sediments and destroy the original orientation of particles.
43. General term for all altered and unaltered rocks around a pluton.
44. Process whereby rocks are altered by heat, temperature and hydrothermal solutions.

45. Group of interacting parts that function as a unit.
46. Circular to oval opening in the ground from which material is ejected.
47. Texture of an igneous rock that contains both phenocrysts and groundmass.
48. General term for layering in sedimentary rocks.
49. Surface of contact between adjacent rock layers.
50. Particle in an atom that determines all of its chemical and all but one of its physical properties.
51. Process whereby rocks break free and sink into a mass of magma.
52. Dense, heavy cloud of super heated gas and debris ejected from a volcano.
53. Element or special type of chemical compounds of which most rocks are composed.
54. Structure or feature formed where basaltic lava erupts under water.

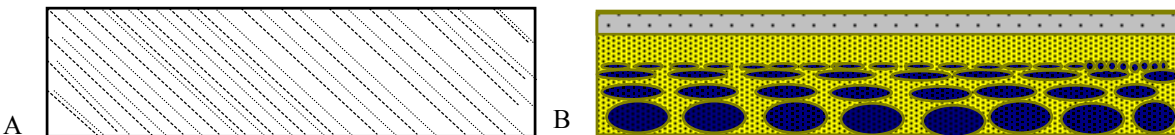
B. Content: True or False. Place a **T** in the blank for each true statement. If false, leave the blank empty.

1. The faster a melt cools, the smaller the crystals in the resulting rock are likely to be.
2. Columnar jointing results from the hexagonal shape of the silicate minerals.
3. Metamorphism frequently involves the melting of rocks and minerals.
4. If two minerals have the same crystal structure, their other properties should be the same also.
5. Large grains weather faster than smaller ones because large grains have more surface area.
6. Eruptions of mafic lava are more likely to be quiet eruptions than explosive.
7. Oxidation is the same thing as rusting or tarnishing.
8. Glass forms when magma cools too quickly for crystals to form and therefore is not crystalline.
9. Stratification in sedimentary rocks is formed after lithification.
10. When atoms form chemical compounds they share their protons and electrons.
11. Turbidity currents should produce graded bedding.
12. Minerals of the discontinuous series in Bowen's reaction series are totally distinct and unrelated to each other in composition and structure and that is why it is called discontinuous.
13. Lithification of clay-rich sediments does not require cementation.
14. Because of erosion the slowest sediment deposition is on the continental slope.
15. All rocks are composed of minerals.
16. Turbidity currents erode the shelf and slope, but deposit sediments on the rise and abyssal plains.
17. With distance from the vent, size of pyroclastic debris generally decreases.
18. In both pedocals and laterites calcium and magnesium are dissolved and washed out of the soil.
19. Minerals can vary greatly in chemical composition, but are never man-made, liquid or organic.
20. All homogenous beds are produced by bioturbation.
21. Frost wedging is the dominant type of weathering in the polar regions.
22. Over time as a melt cools the composition of the melt would be expected to change.
23. The fluidity of lava increases with increasing gas content and temperature and decreasing silica content. Thus, a cool mafic lava may be as viscous as a hot felsic lava.
24. A bedding plane represents an environmental change.
25. As rocks are heated or placed under pressure, they become more chemically reactive.
26. Silicates are the most abundant and complex of mineral groups because of their hexagonal structure.
27. Contraction from drying produces mudcracks, but contraction from cooling forms columnar jointing.
28. Nuee ardente eruptions are more likely associate with gas-rich felsic lavas than mafic lavas.
29. Xenoliths are likely to display some degree of metamorphism.
30. Tool marks form before the deposition of the overlying bed; load cast form afterwards.
31. Mafic lavas always produce a pahoehoe texture.
32. A geode becomes a nodule when crystals totally fill the original open space.

33. Most, but not all, igneous rocks begin as a melt.
34. The area where sediments are least likely to be destroyed are the pericontinental seas.
35. Either as elements or chemical compounds, all matter is composed of atoms.
36. In order for a new rock to form, a pre-existing rock must be destroyed.
37. Some minerals are resistant to chemical weathering in dry environments, but not in humid ones.
38. Physical weathering breaks large rocks into smaller pieces, greatly increasing the rock surface area and thereby increasing the volume of the rock.
39. The initial force behind magma migration is the increase in volume as rocks melt.
40. Once a volcano is extinct it will never erupt again.
41. The weight of an atom is mainly determined by the number of protons and neutrons.
42. Magma chambers or batholiths form the largest of all plutons.
43. Rate of chemical weathering increases as temperature decreases between 0°C and 100°C.
44. In a given environment all minerals chemically weather at about the same rate.
45. Plutons are more likely to have a phaneritic than aphanitic texture.
46. The type of rock that weathers is the major controlling factor in determining the type of soil that will develop.
47. Shield volcanoes are more commonly associated with quiet eruptions and cinder cones usually are produced by explosive eruptions.
48. Nodules and pseudonodules have a different composition than the bed in which they occur, but nodules are composed of material transported into the bed, whereas pseudonodules form in place.
49. Igneous eruptions can produce lava, pyroclastic debris and gas.
50. Hydrothermal fluids alone cannot cause metamorphism.
51. Fissure flows over time can produce the largest extrusive igneous bodies.
52. The continental slope is a steep incline between the continental shelf and rise.
53. As a melt migrates, its composition should be expected to change.
54. Each soil horizon represents a different rock layer that weathered away to produce the soil.
55. Abundant humus and humic acid is necessary for the production of a pedocal and laterite.
56. The major gas released in volcanic eruptions is steam.
57. A calcite sandstone that is metamorphosed is likely to become marble.
58. Plutons are never visible as they form, but must be exposed by erosion.

Diagrams and Graphs

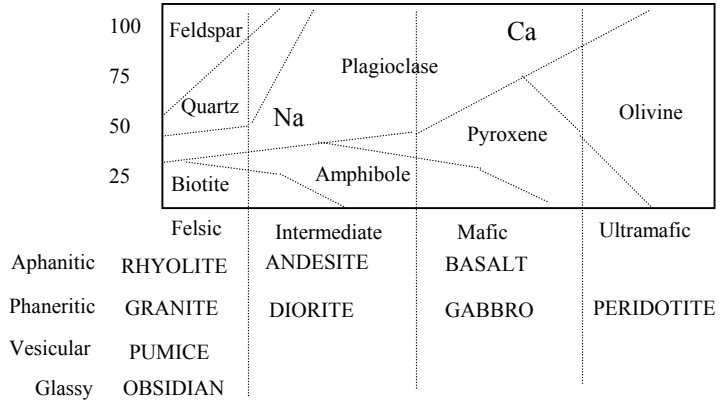
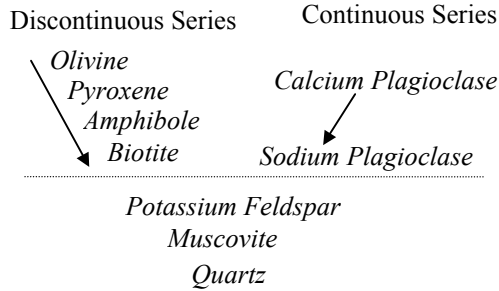
C. Using the terms in the word bank, identify the type of bedding illustrated below.



D. The following questions refer to the Bowen's Reaction Series and Igneous Rock Chart illustrated on the next page. *Use the word bank to answer the following questions.*

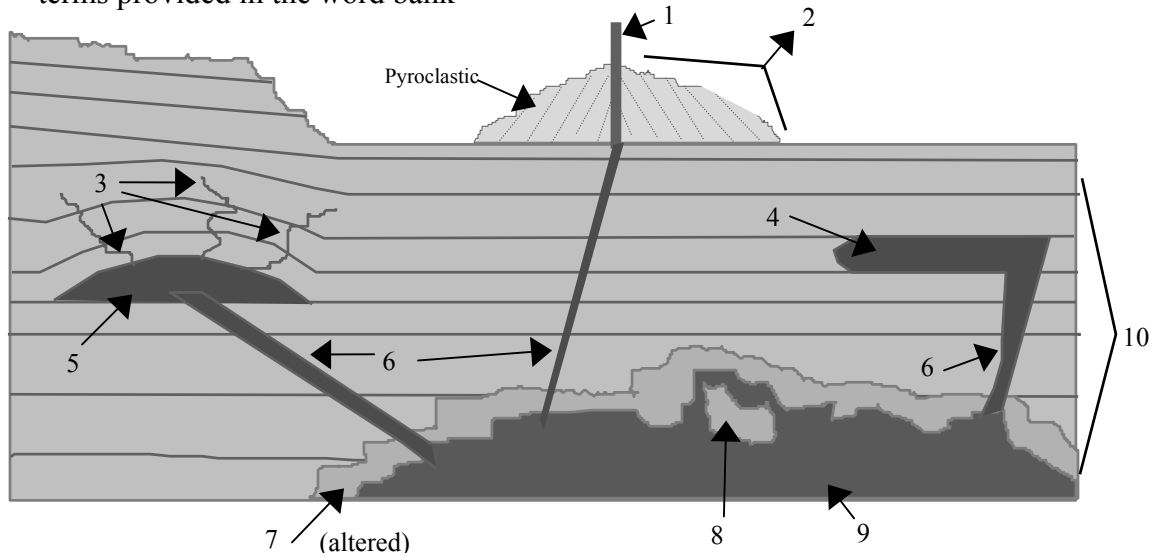
- D1.** A piece of basalt is placed into a container and slowly heated. What will be the last mineral within the basalt to melt? **D2.** What will be the first mineral of the discontinuous series to melt in this rock?
- D3.** A piece of diorite is placed into a container and is slowly heated. What will be the first mineral within the diorite to melt? **D4.** What will be the last mineral of the discontinuous series to melt?

- D5.** A piece of obsidian is melted completely and the melt is allowed to cool very slowly. What igneous rock will likely be produced?
D6. As a piece of granite weathers, what will be the first mineral of the discontinuous series to show signs of chemical weathering? **D7.** What will be the last mineral in the rock to weather?
D8. What type of igneous rock will be the first to form as magma cools? **D9.** What will be the last rock to form from the magma?

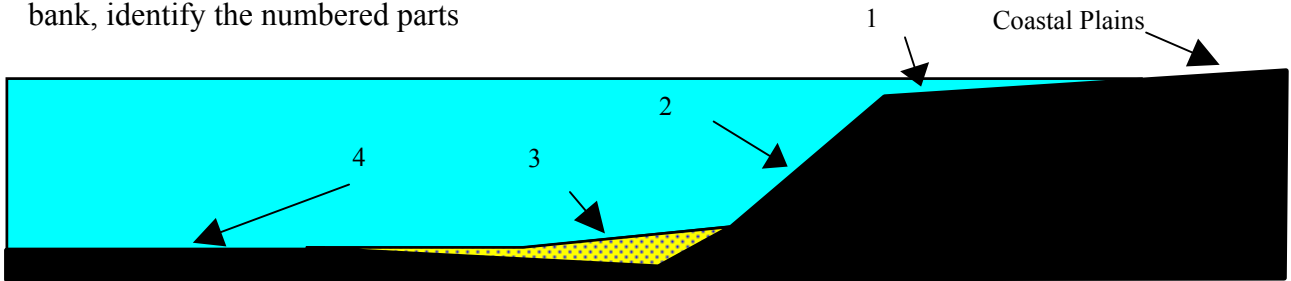


1

E. Identify the features and igneous bodies illustrated on the cross section below. Use the terms provided in the word bank



F. Below is a cross section of the edge of an ocean basin. Using the terms in the word bank, identify the numbered parts



Answer Sheet.

A. Place the **number** from the word bank into the blank.

- | | | | | |
|-----------|-----------|-----------|-----------|-----------|
| 1. 71__ | 12. 56__ | 23. 110__ | 34. 87__ | 45. 116__ |
| 2. 72__ | 13. 111__ | 24. 99__ | 35. 19__ | 46. 120__ |
| 3. 63__ | 14. 47__ | 25. 105__ | 36. 7__ | 47. 96__ |
| 4. 10__ | 15. 43__ | 26. 49__ | 37. 61__ | 48. 113__ |
| 5. 85__ | 16. 3__ | 27. 118__ | 38. 21__ | 49. 14__ |
| 6. 35__ | 17. 34__ | 28. 18__ | 39. 119__ | 50. 97__ |
| 7. 93__ | 18. 44__ | 29. 114__ | 40. 9__ | 51. 112__ |
| 8. 13__ | 19. 4__ | 30. 59__ | 41. 103__ | 52. 81__ |
| 9. 117__ | 20. 38__ | 31. 92__ | 42. 16__ | 53. 75__ |
| 10. 115__ | 21. 45__ | 32. 42__ | 43. 28__ | 54. 91__ |
| 11. 67__ | 22. 95__ | 33. 8__ | 44. 74__ | |

B. Place a T in the blank for true statements; leave blank for false statements.

- | | | | | |
|----------|----------|----------|----------|----------|
| 1. T__ | 13. T__ | 25. T__ | 37. T__ | 49. T__ |
| 2. ____ | 14. ____ | 26. ____ | 38. ____ | 50. ____ |
| 3. ____ | 15. ____ | 27. T__ | 39. T__ | 51. T__ |
| 4. ____ | 16. T__ | 28. T__ | 40. ____ | 52. ____ |
| 5. ____ | 17. T__ | 29. T__ | 41. T__ | 53. T__ |
| 6. T__ | 18. ____ | 30. T__ | 42. T__ | 54. ____ |
| 7. T__ | 19. ____ | 31. ____ | 43. ____ | 55. ____ |
| 8. ____ | 20. ____ | 32. ____ | 44. ____ | 56. T__ |
| 9. ____ | 21. ____ | 33. ____ | 45. T__ | 57. T__ |
| 10. ____ | 22. T__ | 34. ____ | 46. ____ | 58. T__ |
| 11. T__ | 23. T__ | 35. T__ | 47. T__ | |
| 12. ____ | 24. T__ | 36. T__ | 48. ____ | |

C, D, and E. Place the **number** for the correct term from the word bank into the blank

- | | | | | |
|----------|-----------|-----------|-------------|-----------|
| CA. 29__ | D4. 100__ | D9. 53__ | E5. 64__ | E10. 28__ |
| CB. 52__ | D5. 53__ | E1. 31__ | E6. 32__ | F1. 25__ |
| D1. 83__ | D6. 5__ | E2. 20__ | E7. 10__ | F2. 26__ |
| D2. 5__ | D7. 101__ | E3. 32__ | E8. 123/112 | F3. 27__ |
| D3. 15__ | D8. 88__ | E4. 109__ | E9. 12__ | F4. 2__ |

WORD BANK**A**

1. aa
2. abyssal plains
3. acid
4. active
5. amphibole
6. andesite
7. anthracite
8. atmosphere
9. atoms
10. aureole

B

11. base
12. batholith
13. bauxite
14. bedding plane
15. biotite
16. bioturbation

C

17. Ca plagioclase
18. caliche
19. cauldера
20. cinder cone
21. claystone
22. columnar jointing
23. concordant
24. concretion
25. continental shelf
26. continental slope
27. continental rise
28. country rock
29. cross bedded
30. current ripple

D

31. diatreme
32. dike
33. diorite
34. discordant
35. disintegrate
36. dormant

E

37. electron
38. element
39. epicontinental
40. extinct

F

41. fabric
42. facies
43. felsic
44. flame structure
45. flank flow
46. fissure
47. foliation

G

48. gabbro
49. geode
50. glassy
51. gneiss
52. graded bedded
53. granite

H

54. hexagon
55. homogenous bedding
56. humus
57. hydrogen ion
58. hydrosphere
59. hydroxyl ion

I/J/K

60. infantile water
61. juvenile water
62. K feldspar
63. kimberlite

L

64. laccolith
65. lava
66. lava dome
67. lithification
68. litter
69. load cast

M

70. mafic
71. magma
72. magmatic differentiation
73. marble
74. metamorphism
75. mineral
76. mudcracks
77. muscovite

N

78. Na plagioclase
79. neutrons
80. nodules
81. nueé ardente

O

82. obsidian
83. olivine
84. oxidation

P

85. pedalfer
86. pedocal
87. pericontinental
88. peridotite
89. phaneritic
90. phenocryst
91. pillow lava
92. pluton
93. poehoehoe
94. polygon
95. pore space
96. porphyritic
97. proton
98. pumice
99. pyroclastic debris
100. pyroxene

Q/R

101. quartz
102. quartzite
103. regolith
104. rhyolite

S

105. sediments
106. shale
107. shield volcano
108. silicates
109. sill
110. slate
111. sole markings
112. stoping
113. stratification
114. stratovolcano
115. symmetrical ripples
116. system

T

117. tetrahedron

118. texture
119. turbidity current

V/W/X

120. vent
121. vesicular
122. vug
123. xenolith

Earth Systems Section 2 Test 2-1

A. **Vocabulary.** Select the most appropriate word from the word bank.

1. Name for a large earthquake-generated wave in the sea.
2. Deepest part of the ocean.
3. State of material when it has a fixed volume and shape.
4. Term for the temperature below which a rocks magnetism is “frozen” in place.
5. Term for a lithospheric plate containing both oceanic and continental crust.
6. Name for the upwelling of mantle below a hot spot.
7. Invalid hypothesis that extrusion of oceanic crust produced continental movement.
8. Point inside the Earth from which earthquake waves originate.
9. Process which transports large amounts of sediment to the continental rise.
10. Mountains in which the rocks are highly folded, faulted and metamorphosed.
11. Scratches or gouges on the fault plane.
12. The young portion of the oceanic ridge not buried by sediment.
13. Fault that combines both vertical and lateral motion.
14. Small tremors that precede a major earthquake.
15. Beyond this value, rocks behave as a brittle material and fault.
16. Flat, featureless part of the ocean floor.
17. Fluid soil condition during an earthquake caused by water escaping from collapsing pore space.
18. All objects moving across the Earth’s surface inscribe this shape line.
19. Type of plate boundary characterized by shallow to deep foci earthquakes.
20. When differential erosion produces a mountain from a syncline.
21. Index of the energy and wave motion at the source of an earthquake.
22. Gradual change in temperature with depth within the Earth.
23. Area 11,000 to 14,000 km from the epicenter where neither S nor P waves are recorded.
24. Term for the increase in the volume of a rock because of the formation of cracks.
25. Intersection of the fault plane and Earth’s surface.
26. General term for phenomena that precede an event such as a earthquake.
27. Flat-topped submarine hill taller than 1000m above adjacent sea floor.
28. Plot of magnetism illustrating the changing relative position of a plate to the magnetic pole.
29. Plastic layer within the Earth.
30. A rift valley is an example of this type of specialized fault structure.
31. Uppermost edge of the continental slope where water depth is about 200m.
32. General term for all waves that travel through the interior of the Earth.
33. Term for the plate that contains the island arc.
34. Earth’s magnetic field.
35. Structure formed when decrease lateral compression results in progressively less folding.
36. General term for the lateral flow of a fluid.
37. Earthquake wave that can only pass through solids and plastics.
38. Source of heat for the interior of the Earth.
39. A circular anticline.
40. General term for the orientation of a magnetic field.
41. The continental rise is composed of these structures which have merged.
42. Name of process whereby one plate slides below another and descends into the mantle.
43. Earthquake wave that produces a Rayleigh wave when it reaches Earth’s surface.
44. Record of past magnetism preserved in a rock.
45. Bending of waves into a medium where they travel more slowly.
46. Type of stress that causes rifting and forms the rift valley.

B. Content. On the Answer Sheet place a **T** in the blank for all true statements. *Leave blanks empty for all false statements.*

1. Rift valleys only occur on the continents.
2. Most earthquake precursors are the result of dilatancy.
3. Waves refract into areas where they travel more rapidly.
4. The Moho represents both a change in composition and physical state.
5. P waves are the fastest of the surface waves and can pass through all physical states.
6. Plate motion defines the location of the spreading pole, the location of the spreading pole does not determine plate motion.
7. If maximum plastic deformation limit is exceeded, rock faults rather than folds.
8. Continents are never subducted below oceanic crust but can slide below other continents.
9. The farther a point is from the epicenter, the deeper earthquake waves travel before reaching it.
10. Tension can only produce synclines, not anticlines.
11. All oceanic ridges are located in the center of ocean basins.
12. Three seismic recording systems in different regions are required to locate an epicenter.
13. Most folding occurs underground and only becomes visible when exposed by erosion.
14. Fracture zones produce transcurrent faults.
15. Translational faults are combined normal, reverse or vertical motion with transform motion.
16. In the future it may be possible to control earthquakes by pumping water along fault planes.
17. Microcontinents only are found on microplates.
18. In general, the sea floor adjacent to the continent is older than farther away from the continent.
19. The chain of volcanoes associated with a hot spot form as the area of upwelling migrates.
20. An earthquake of magnitude 4 releases 32 times the energy released by a magnitude 3.
21. The surface of the abyssal plains is smooth because the underlying oceanic crust is smooth.
22. The Benioff zone is located below the subducted plate.
23. At the outer core S-waves are extinguished and P-waves are refracted up into the mantle.
24. The driving force of plate tectonics is heat.
25. A material's physical state is a function of temperature and pressure relative to composition.
26. In vertical faults there is no hanging wall, foot wall, upthrown block or downthrown block.
27. Geolithosphere is divided into three layers by compositional and five by physical state.
28. Temperature, pressure and density all increase towards Earth's center.
29. Some rotational faults are normal to one side of the pivot point and reverse on the other side.
30. Every earthquake can be felt by people located at the epicenter.
31. Polar reversals indicate that periodically the Earth's direction of rotation reverses.
32. Slickenslides can indicate direction of motion.
33. Lag time increases as distance from epicenter and focus increase.
34. Samples of Earth's core reveal that it is rich in iron, nickel and cobalt.
35. Active volcanoes are mainly found at divergent and convergent boundaries and hot spots.
36. Intensity of an earthquake increases with distance from the epicenter and focus.
37. The continental crust is Earth's least dense rock and the inner core is Earth's most dense.
38. The continental slope forms a steep inclination from the shelf break to the oceanic crust.
39. Tsunamis pose a threat to ships in the open ocean, as well as near land.
40. Polar wandering curves tell more about plate motion than movement of the magnetic poles.
41. Falling into large cracks in the ground which quickly close is a major danger in earthquakes.
42. The base of the continental crust bulges downward under mountains.
43. An earthquake of magnitude 4 is twice as strong as an earthquake of a Magnitude 2.
44. Earthquake foci tend to be shallow for divergent and transform boundaries.
45. All seamounts were once islands and now have flat tops because of wave erosion.
46. Thrust faults result in little horizontal displacement from great vertical displacement.

C. Diagrams

1. Using the terms in the word bank to the right, identify each of the lettered parts on the of the **cross section of the Earth.**

G = combined A + B

H = combined B + C + D

I = combined E + F

J = Boundary between A and B

K = Boundary between D and E

L = A through F

WORD BANK

1. asthenosphere

2. crust

3. inner core

4. mantle

5. Mohorovicic Discontinuity

6. outer rigid mantle

7. core

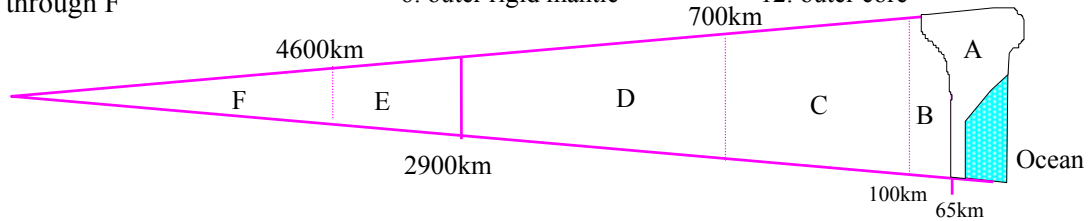
8. geolithosphere

9. Gutenberg Discontinuity

10. lithosphere

11. mesosphere

12. outer core



D. **Structures.** Identify each of the following structures **illustrated in cross section** employing the terms from the word bank to the right.

1. anticline

2. graben

3. horizontal beds

4. horst

5. monocline

6. normal fault

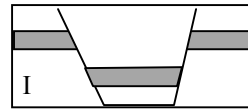
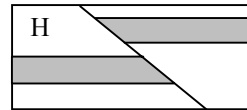
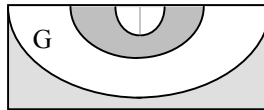
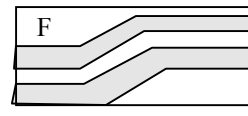
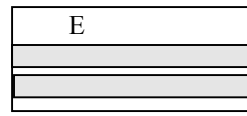
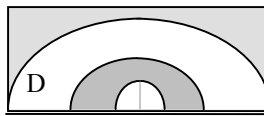
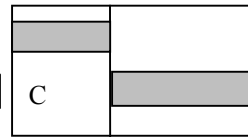
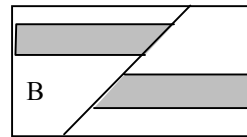
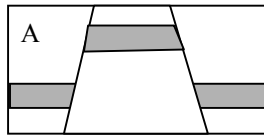
7. reverse fault

8. rotational fault

9. syncline

10. transform fault

11. vertical fault



E. **Plate Tectonics.** The following maps refer to the map on the following page. On the Answer Sheet place a **T** in the black for all true statements. **Leave blanks empty for all false statements.**

1. Feature A is a transform fault.

2. Magenta Island chain is an island arc.

3. Teal Island chain are a nemathat.

4. Yellow Islands were produced by a hot spot.

5. Red Mountains on continent A probably are composed of the same rocks as East Pink Islands to the north.

6. Green Mountains on continent A probably were produced by past continental collision.

7. Plate 2 is the over-riding plate along the western boundary with Plate 1.

8. C are fracture zones.

9. B are transform faults.

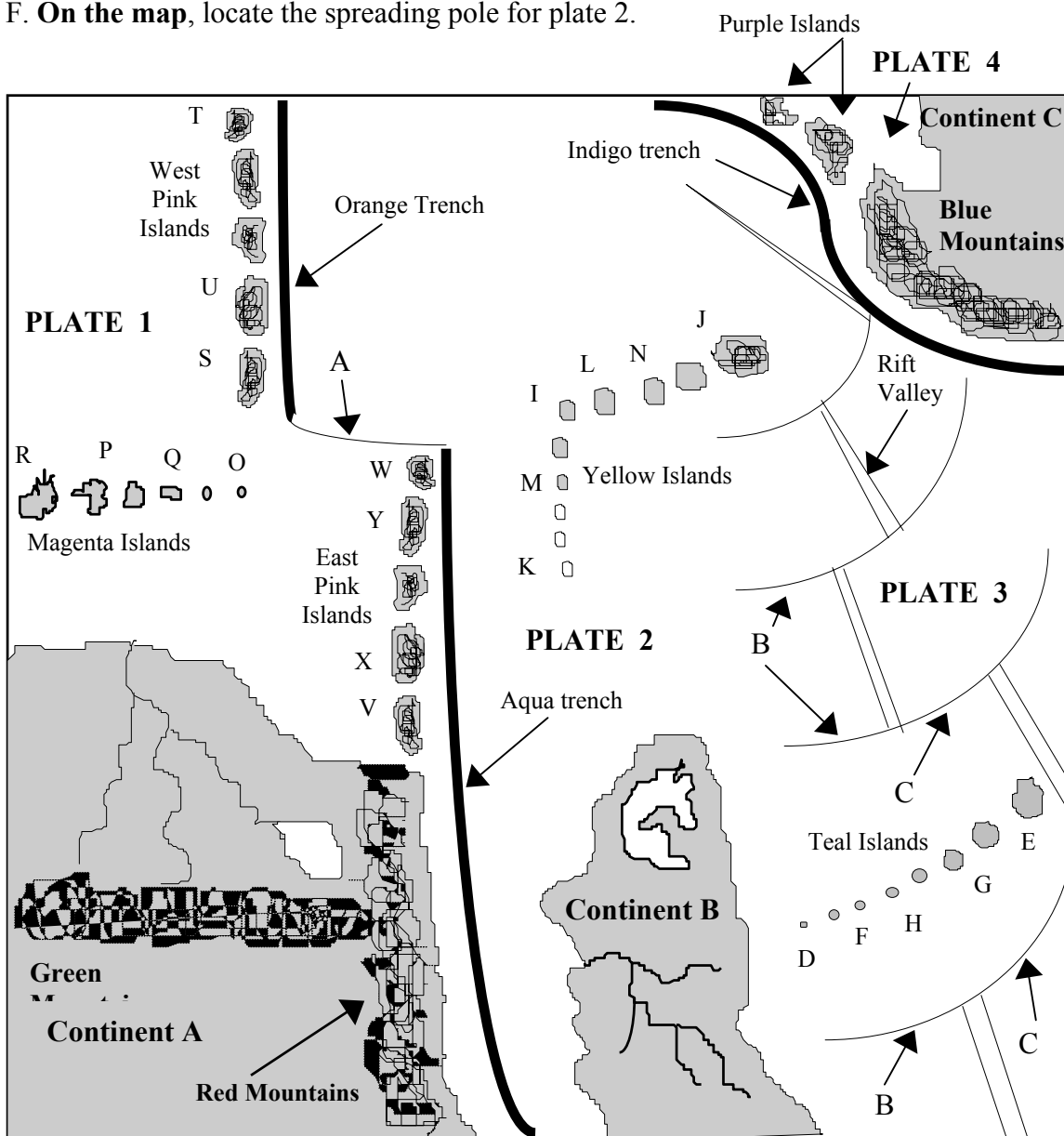
10. The map indicates that Plate 2 once moved southward.

11. The oldest island in the Magenta Island chain is O.

12. If current plate motion continues into the distant future, a structural mountain chain will develop along the west coast of continent B.

13. Island T is the oldest island and V the youngest in the West and East Pink Island chain.
14. Magenta, Pink, Yellow, Teal and Purple islands are all probably composed of basalt.
15. Some of the curved lines B probably continue to continent B, but are buried by sediment near the continent.
16. The Pink Islands indicate that Plate 1 once moved southward, but now moves eastward.
17. Plate 3 is moving northeastward.
18. Plate 2 currently moves westward.

F. On the map, locate the spreading pole for plate 2.



A. Vocabulary

1. 126__
2. 125__
3. 104__
4. 22__
5. 14__
6. 63__
7. 99__
8. 36__
9. 127__
10. 107__
11. 102__
12. 95__
13. 124__
14. 38__
15. 80__
16. 2__
17. 54__
18. 4__
19. 20__
20. 121__
21. 61__
22. 42__
23. 86__
24. 23__
25. 34__
26. 85__
27. 116__
28. 83__
29. 6__

30. 43__
31. 101__
32. 10__
33. 76__
34. 60__
35. 82__
36. 3__
37. 114__
38. 88__
39. 29__
40. 84__
41. 111__
42. 109__
43. 87__
44. 77__
45. 91__
46. 117__

B. Content

1. _____
2. T____
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99. _____
100. _____

C. Cross Section

- A. 2__
- B. 6__
- C. 1__
- D. 11__
- E. 12__
- F. 3__
- G. 10__
- H. 4__
- I. 7__
- J. 5__
- K. 9__
- L. 8__

D. Structures

- A. 4__
- B. 7__
- C. 11__
- D. 1__
- E. 3__
- F. 5__
- G. 9__
- H. 7__
- I. 2__

E. Plate Tectonics

1. T____
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3. T____
4. T____
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11. T____
12. T____
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14. T____
15. T____
16. _____
17. T____
18. T____

F. Just NE of Island J
in the Yellow
Chain

Earth Systems Section 2 Test 2-2

A. **Vocabulary.** Select the most appropriate word from the word bank.

1. Wave phenomenon whereby waves bounce off of boundaries and travel in a different direction.
2. Name for the gradual change in temperature with depth inside the Earth.
3. Name applied to earthquake-prone area of the over-riding plate.
4. Scale that measures earthquakes in the amount of movement and damage they cause.
5. Name for the outer edge of the continent that is flooded by the ocean.
6. Scars left on the surface of a lithospheric plate by a transform fault.
7. Scratches and grooves on the fault plane that indicate relative direction of motion.
8. Sand boils and blowouts result from this earthquake-related phenomenon.
9. That portion of the Earth that is composed of the least dense rock.
10. General name for all earthquake waves that travel along rock boundaries and Earth's surface.
11. Name of a lithospheric plate that contains a large section of seafloor and a small continent.
12. Flattest part of the seafloor where sediments bury all irregularities.
13. Physical state of matter when both volume and shape do not change with time.
14. Point within the Earth where an earthquake begins.
15. Name applied to the stream of high energy particles ejected from the Sun.
16. Uplifted ridge bounded on opposite sides by normal faults.
17. General term for a boundary separating material of different composition.
18. Beyond this pressure rocks fracture and break rather than bend or fold.
19. Name of the force that pulls things apart, such as plates at a rift valley.
20. General name for the geographic location above a mantle plume.
21. Time between the arrival of the P-wave and the S-wave.
22. Name for the entire rock portion of the Earth.
23. Type of radioactive reaction that generates the heat within the Earth.
24. Temperature at which the magnetism of a rock becomes fixed as molten material cools.
25. All of the earthquake precursors may be related to this phenomenon.
26. Point on the Earth's surface about which a lithospheric plate revolves as it moves.
27. Part of the Earth surface where no compressional waves are recorded for a given earthquake.
28. Elongate, deep depression in the sea floor.
29. Name of the science of the study of earthquakes.
30. Exposed, sediment-bare top of an oceanic ridge; includes the rift valley.
31. Giant ocean wave produced by an underwater earthquake.
32. Hypothesis that continents essentially floated across the seafloor similar to icebergs in water.
33. Name of Earth's magnetic field.
34. Term for when synclines are eroded into mountains and anticlines into valleys.
35. Small earthquakes which occur before a major one.
36. General term for lithospheric plates that measure only a few thousand square miles in area.

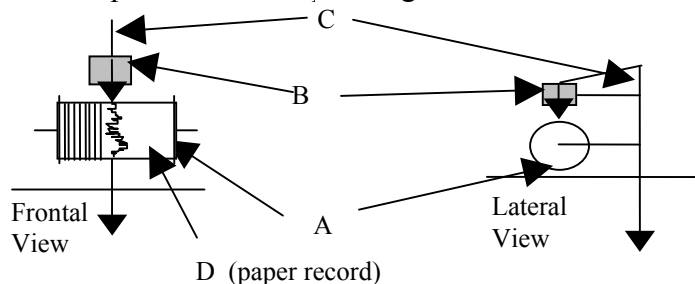
B. Identify the earthquake wave. **Place the number** assigned the wave type in the blank. 1. P-wave; 2. S-wave; 3. L-wave; 4. Love wave; 5. Rayleigh wave. Some may have more than one answer.

1. Fastest of all earthquake waves.
2. Body waves that require a vertical motion seismic recording system to measure them.
3. Produces Love waves when they reach the Earth's surface.
4. A rolling motion similar to waves at sea.
5. Body wave in which particles vibrate perpendicularly to the direction the wave travels.
6. Can only travel through materials in solid or plastic state.
7. Produce Rayleigh waves when they reach the Earth's surface.

C. **Content.** Place a **T** in the blank for true statements. *Leave blanks empty for false statements.*

1. The P-wave shadow zone encompasses a larger area than does the S-wave shadow zone.
2. Body waves only travel toward Earth's surface, not toward the interior of Earth.
3. Seafloor trenches are deeper than continental mountains rise above sea level.
4. The rate of rifting must be balanced by the same rate of subduction on Earth.
5. Speed of earthquake waves is controlled by rock composition and physical state.
6. Continents are pushed apart by seafloor rifting at the oceanic ridge crest.
7. Average rock type of the sea floor is basalt and for the continents it is gneiss.
8. In earthquakes the transducer and recorder are motionless as the inertia member moves.
9. A rotational fault is normal on one side of the pivot point and reverse on the other.
10. With time, the abyssal hills are eroded down and become part of the abyssal planes.
11. Physical state of matter is a function of composition, temperature and pressure.
12. Rocks in the asthenosphere are in a molten state and flow in convection cells.
13. Composition of the core is known from samples of the outer core.
14. Neither S-waves nor P-waves can pass through the core.
15. Compression can cause folding and faulting; tension only produces faulting.
16. Lag time decreases with distance from the epicenter because S-waves overtake P-waves.
17. Continental plates consist of outer rigid mantle and a continent, but no oceanic crust.
18. The Benioff Zone lies beneath both the subducted and over-riding plates at a trench.
19. Waves are reflected into regions where they travel more slowly.
20. Earth's magnetic field deflects the solar wind and periodically reverses polarity.
21. Intensity of an earthquake is in part determined by the distance from the epicenter.
22. The lithosphere consists of the outer rigid mantle and the crust.
23. At the focus a magnitude 4 earthquake has 1000 times the motion of a magnitude 1.
24. Rocks of the inner core are richer in cobalt than the outer core and therefore are solid.
25. Hot spots only occur away from the edges of lithospheric plates.
26. The geolithosphere is divided into three compositional and five physical-state layers.
27. Precursors predict earthquakes, but do not indicate how soon they will occur.
28. Island arcs consist of basalt, but volcanic mountains near trenches usually are andesite.
29. Polar wandering curves reflect plate tectonics more than the movement of the poles.
30. A translation fault combines vertical and horizontal motion.
31. Temperature, pressure and rock density increase towards the Earth's center.
32. Rock and fossil ages and sediment thickness are greater at ocean basin edges than center.
33. Some lithospheric plates travel in arcs across Earth's surface and others in straight lines.
34. Continental crust is thicker, lighter in colour and less dense than the oceanic crust.
35. Magnitude scale is based upon the wave motion at the focus, not the epicenter.

D. Identify the parts of the seismic recording system illustrated below. **Select answers from the Word Bank** and place the corresponding **number** on the Answer Sheet.



E. Diagrams

1. Using the terms in the word bank *to the right*, identify each of the lettered parts on the of the **cross section of the Earth** and the list (G-L) below.

G = combined A + B

H = combined B + C + D

I = combined E + F

J = Boundary between A and B

K = Boundary between D and E

L = A through F

1. asthenosphere

2. crust

3. inner core

4. mantle

5. Mohorovicic Discontinuity

6. outer rigid mantle

WORD BANK

7. core

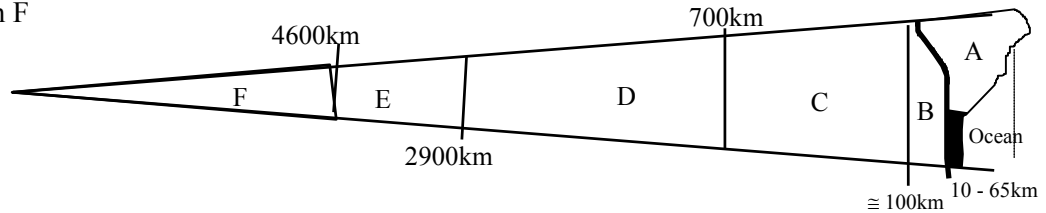
8. geolithosphere

9. Gutenberg Discontinuity

10. lithosphere

11. mesosphere

12. outer core



F. **Structures.** Identify each of the following structures **illustrated in cross section** employing the terms from the **word bank to the left**.

1. anticline

2. graben

3. horizontal beds

4. horst

5. monocline

6. normal fault

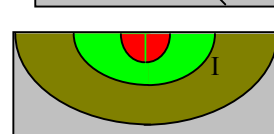
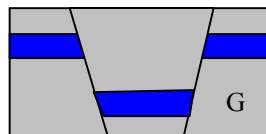
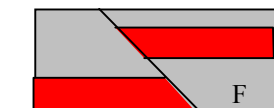
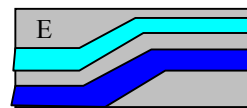
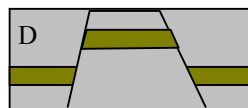
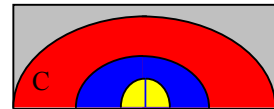
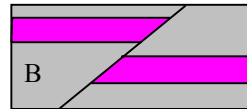
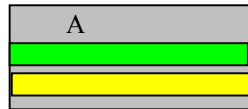
7. reverse fault

8. rotational fault

9. syncline

10. transform fault

11. vertical fault



G. **Plate Tectonics.** Answer these questions based upon the evidence shown on the map on the next page. Place a **T** in the blank for all true statements. **Leave blanks empty if false.**

1. Tmeric Islands are an island arc.

2. East and West Coleman Mts. were once a single chain, but were separated by rifting.

3. East and West Orbec Islands were produced by hot spots.

4. Lowell Islands are an island arc.

5. North and South Ordac Mts. were once a single chain, but were separated by rifting.

6. Sonda Lakes most likely occupy an active rift valley.

7. Senic Bay is wider to the south because of greater rifting in that area.

8. Feature J is a transform boundary.

9. North Ordac Mts. and East Coleman Mts. are most likely composed of volcanic rocks.

10. Lowell islands indicate that Plate 1 had move to the east but now to the southeast.

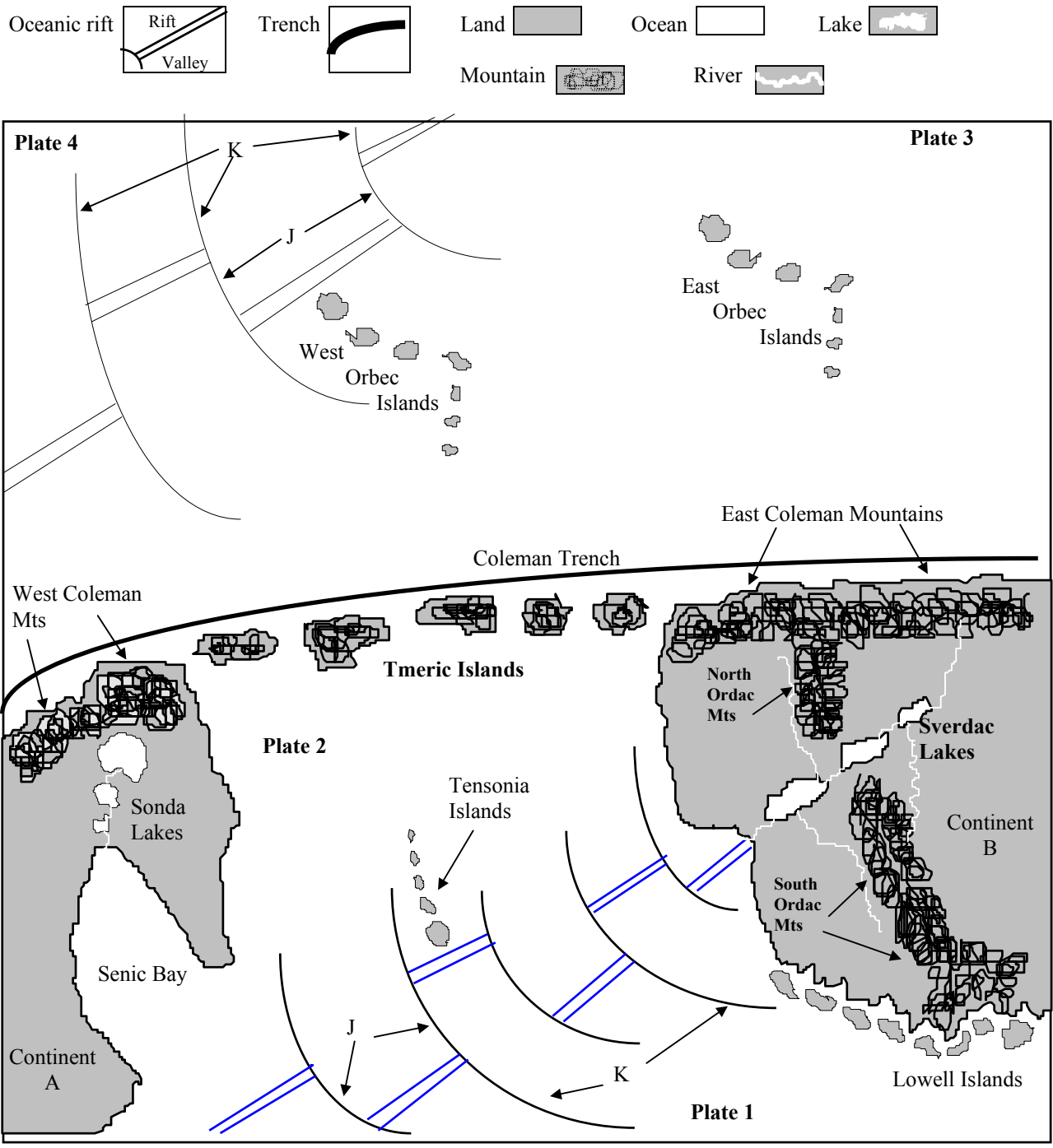
11. Plate 3 is the subducted plate and plate 2 the over-riding plate.

12. Feature K are fracture zones.

13. Tensonia, Tmeric and East and West Orbec islands are likely to be composed of basalt.

14. Continents A and B are converging into a single landmass.
15. Plate 2 is moving toward the north.
16. The oldest island in the Tmeric Chain is closest to Continent B
17. The Tensonia chain are a nemathat.
18. The oldest part of Plate 3 is most likely at the trench.
19. The Benioff zone extends below the Tmeric Islands but not the Coleman Mts.

H. **On the map**, locate the spreading pole for plate 2.



A. Vocabulary

1. 68__

2. 31__

3. 5__

4. 37__

5. 12/13/77

6. 27__

7. 78__

8. 41__

9. 8/14_

10. 86__

11. 10__

12. 2__

13. 80__

14. 25__

15. 79__

16. 34__

17. 17__

18. 62__

19. 89__

20. 35__

21. 40__

22. 30__

23. 24__

24. 15__

25. 16__

26. 4/81_

27. 65__

28. 95__

29. 75__

30. 70__

31. 96__

32. 9__

33. 46__

34. 91__

35. 26__

36. 51__

B. Waves

1. 1__

2. 1__

3. 2__

4. 5__

5. 2__

6. 2__

7. 1__

C. Content

1. ____

2. ____

3. T__

4. T__

5. T__

6. ____

7. ____

8. ____

9. T__

10. ____

11. T__

12. ____

13. ____

14. ____

15. T__

16. ____

17. ____

18. ____

19. ____

20. T__

21. T__

22. T__

23. T__

24. ____

25. T__

26. T__

27. ____

28. T__

29. T__

30. T__

31. T__

32. T__

33. ____

34. T__

35. T__

D. Seismometer

A.66__

B.36__

C.92__

D.76__

E. Diagram

A.2__

B.6__

C.1__

D.11__

E.12__

F.3__

G.10__

H.4__

I.7__

J.5__

K.9__

L.8__

F. Structures

A.3__

B.7__

C.1__

D.4__

E.5__

F.7__

G.2__

H.11__

I.9__

G. Plate Tectonics

1. T__

2. ____

3. ____

4. ____

5. T__

6. ____

7. ____

8. T__

9. ____

10. ____

11. T__

12. T__

13. T__

14. ____

15. T__

16. ____

17. T__

18. T__

19. ____

H. Place On Map
Near the NE Sverdac
Lake

- A**
1.abyssal hills
2.abyssal plains
3.arc
4.axis of rotation
- B**
5.Benioff Zone
6.body waves
- C**
7.compression
8.continental crust
9.continental drift
10.continental plate
11.continental rise
12.continental shelf
13.continental slope
14.crust
15.Curie Point
- D**
16.dilatancy
17.discontinuity
18.displacement
19.downthrown block
- E**
20.epicenter
21.epicontinental
- F**
22.fault plane
23.fault trace
24.fission
25.focus
26.foreshocks
27.fracture zone
28.fusion
- G**
- 29.gas
30.geolithosphere
31.geothermal gradient
32.graben
33.Gutenberg Discontinuity
- H**
34.horst
35.hot spot
- I**
36.inertia member
37.intensity scale
38.island arc
- K**
39.knolls
- L**
40.lag time
41.liquefaction
42.liquid
43.lithosphere
- M**
44.magnetic polar migration
45.magnetic reversals
46.magnetosphere
47.magnitude scale
48.mantle
49.mantle plume
50.mesosphere
51.microplates
52.Mohorovicic Discontinuity
- N**
53.nemathat
- 54.normal polarity
55.North and South Magnetic Pole
- O**
56.oceanic crust
57.oceanic plate
58.over-riding plate
- P**
59.paleomagnetism
60.pericontinental
61.plastic
62.plastic deformation limit
63.plate tectonics
64.precursors
65.P-wave shadow zone
- R**
66.recorder
67.Rayleigh Waves
68.reflection
69.refraction
70.ridge crest
71.rift valley
72.rifting
73.rotational fault
- S**
74.sea floor spreading
75.seismology
76.seismogram
77.shelf break
78.slickenslides
79.solar wind
80.solid
81.spreading poles
82.subducted plate
83.subduction
84.submarine canyon
85.submarine fan
- 86.surface waves
87.S-wave shadow zone
88.S-waves
- T**
89.tension
90.thrust fault
91.topographic inversion
92.tranducer
93.transform fault
94.translation fault
95.trench
96.tsunami
97.turbidity current
- U**
98.upthrown block
99.upwelling
- V**
100.vertical fault
101.volcanic mountains

Earth Systems Section 2 Test 2-3

A. **Vocabulary.** Select the most appropriate word from the word bank.

1. Name for minor earthquakes that occur before a major one.
2. Part of a seismic recording system that allows relative motion between the ground and inertia member.
3. Name for the entire rock portion of the Earth.
4. Beyond this point of stress, rocks break rather than fold.
5. Below this temperature a rocks magnetism is fixed and can not re-orient itself.
6. General term for all the waves that travel through the interior of the Earth.
7. Term for when rocks under stress break and are displaced.
8. When synclines form mountains and anticlines form valleys because of erosion.
9. Phenomena which do not predict an earthquake but suggests one is more likely to happen.
10. Segment of the outer Earth consisting of continental and oceanic crust and the outer rigid mantle.
11. Point on the Earth's surface above a mantle plume.
12. Scale that measures the wave motion at the focus.
13. Name of the Earth's magnetic field.
14. Area of an over-riding plate where earthquakes are concentrated.
15. Increase in volume because of the formation of cracks.
16. Type of fold that results from gradual decrease in folding force in a given direction.
17. Name for the magnetic field preserved in an igneous rock after it cools.
18. Area between 11,00 and 14,00 kilometers from the epicenter where no P-waves are recorded.
19. Area or block of rock above an inclined fault plane.
20. Hypothesis that continents plowed through the oceanic crust similar to icebergs in the ocean.
21. Scale that measures the severity of shaking at a given locality on the Earth's surface.
22. Point on Earth's surface towards which compass needles point.
23. Deflection of a wave into an area where it travels more slowly.
24. Deepest depressions on the Earth's surface where subduction occurs.
25. When seismically released groundwater temporarily converts turns the ground into a fluid state.
26. Process whereby plates under tension are pulled apart.
27. Name for fluid flowing laterally
28. Flooded edge of a continent covered by pericontinental sea.
29. These waves are generated when P-waves reach an interface.
30. Process that generates heat within the Earth.
31. Scratches and groves on the fault plane.
32. Another name for a seismic sea wave.
33. Name for the written record that shows the relative motion recorded by a seismic recording system.
34. Point on the Earth's surface directly above the focus.
35. Surface with about a 4° inclination between the continental shelf and the continental rise.
36. State of material when has set volume and shape.
37. Term for the orientation of a magnetic field; which end is positive and which is negative.
38. Change in temperature with depth within the Earth.
39. Point on the Earth's surface about which a plate rotates as it moves.
40. Compression, injection and gravity, but not tension, can product this general class of structures.
41. These waves can not travel through fluids, either liquids or gases.
42. Flattest part of the ocean floor where sediments bury oceanic ridge.
43. Time between the arrival of the P-wave and the S-wave.
44. These waves are generated when an S-wave reaches a disconformity.

B. Content. On the Answer Sheet place a **T** in the blank for all true statements. *Leave blanks empty for all false statements.*

1. Rifting occurs above zones of upwelling in the asthenosphere.
2. Refraction of seismic waves at the outer core produces the S-waves shadow zone.
3. Tension can cause rocks to fold into anticline and synclines.
4. An earthquake of magnitude 5 is 100 times stronger than magnitude 3 and releases 1024 times the amount of energy.
5. Differential rotation of the core and the rest of the geolithosphere produces magnetism.
6. In the P-wave shadow zone neither S- nor P-waves are recorded, but P-waves are recorded throughout the S-wave shadow zone.
7. Sand boils and blowouts occur as a result of liquefaction.
8. Foci become progressively deeper away from the trench below the over-riding plate.
9. Periodically the polarity of the magnetosphere reverses.
10. Continental crust is lighter in density and colour than the oceanic crust.
11. L-waves are produced by P-waves, but not S-waves.
12. Transform faults are produced by fracture zones.
13. A polar wandering curve displays the history of magnetic pole migration.
14. Three seismic recording systems are needed to locate an epicenter because there are three types of waves generated, L-, P- and S-waves.
15. Earthquake foci in divergent and transform boundaries are not located below 100km.
16. Although the mesosphere is much hotter than the asthenosphere, the mesosphere is solid.
17. Physical state of matter is a function of composition and density which is a function of temperature and pressure.
18. Divergent and convergent boundaries and hot spots are where most volcanoes occur.
19. Earthquake intensity is a function of distance from focus, ground type and measuring device.
20. Slickenslides can indicate which side actually moved up and which side moved down.
21. Oceanic crust is progressively older towards the ocean center, unless a trench is there.
22. Gravity and meteorites suggest the core is rich in iron, nickel and cobalt.
23. As mantle plumes slowly migrate below a plate a string of volcanoes are created.
24. L-waves only occur at the Earth's surface.
25. The oldest fossils on the sea floor tend to be on the oldest rocks of the oceanic crust.
26. Reflection and refraction of some of the seismic energy occurs at each discontinuity.
27. The oceanic ridges are structural mountains.
28. Minor and major earthquakes are rare phenomena.
29. As plate motion changes, location of the spreading axis will also change.
30. Rift valleys can become trenches as rifting proceeds and the valley deepens.
31. Seismic wave speed rapidly increases at the Moho and Gutenberg discontinuities.
32. In vertical faults there is no upthrown or downthrown and no hanging or foot wall.
33. S-waves travel faster than P-waves in solids, but only P-waves can pass through liquids.
34. Continents move because they are pushed by the expanding sea floor.
35. The continental shelf is not part of the ocean basin, but the slope and rise are.
36. The focus is the point on Earth's surface that suffers the greatest damage from an earthquake.
37. Seismic wave speed decreases in the asthenosphere and outer core.

C. Diagrams

1. Using the terms in the word bank to the right, identify each of the lettered parts on the of the **cross section of the Earth.**

G = combined A + B

H = combined B + C + D

I = combined E + F

J = Boundary between A and B

K = Boundary between D and E

L = A through F

WORD BANK

1. asthenosphere

2. crust

3. inner core

4. mantle

5. Mohorovicic Discontinuity

6. outer rigid mantle

7. core

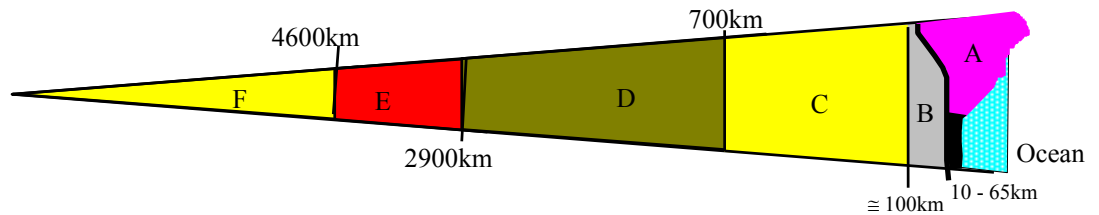
8. geolithosphere

9. Gutenberg Discontinuity

10. lithosphere

11. mesosphere

12. outer core



D. **Structures.** Identify each of the following structures **illustrated in cross section**

employing the terms from the word bank to the right.

1. anticline

2. graben

3. horizontal beds

4. horst

5. monocline

6. normal fault

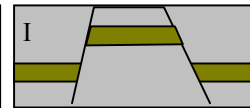
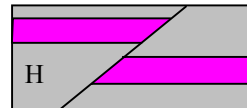
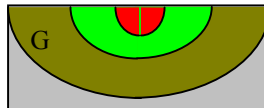
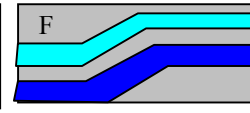
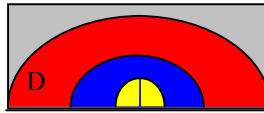
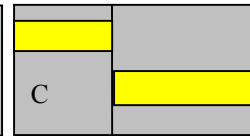
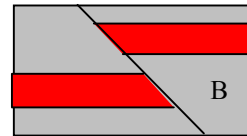
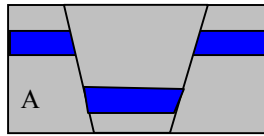
7. reverse fault

8. rotational fault

9. syncline

10. transform fault

11. vertical fault



E. **Plate Tectonics.** The following maps refer to the map on the following page. On the Answer Sheet place a **T** in the black for all true statements. **Leave blanks empty for all false statements.**

1. Feature A is a transform fault.

2. Len Island Chain are an island arc.

3. Hoyt Islands are a nemathat and indicate that plate direction has changed.

4. Morgan Island Chain are an island arc.

5. Transit Island Chain were formed by a hot spot.

6. There is no evidence that plate 1 has moved in a different direction in the past.

7. Coleman Mountains on continent A probably are composed of the same rocks as Len Islands to the west.

8. Rhone and Delti Mountains on continent B probably were produced by past continental collision of two landmasses that now form continent B.

9. Twin Lakes on continent B are most likely located in a graben.

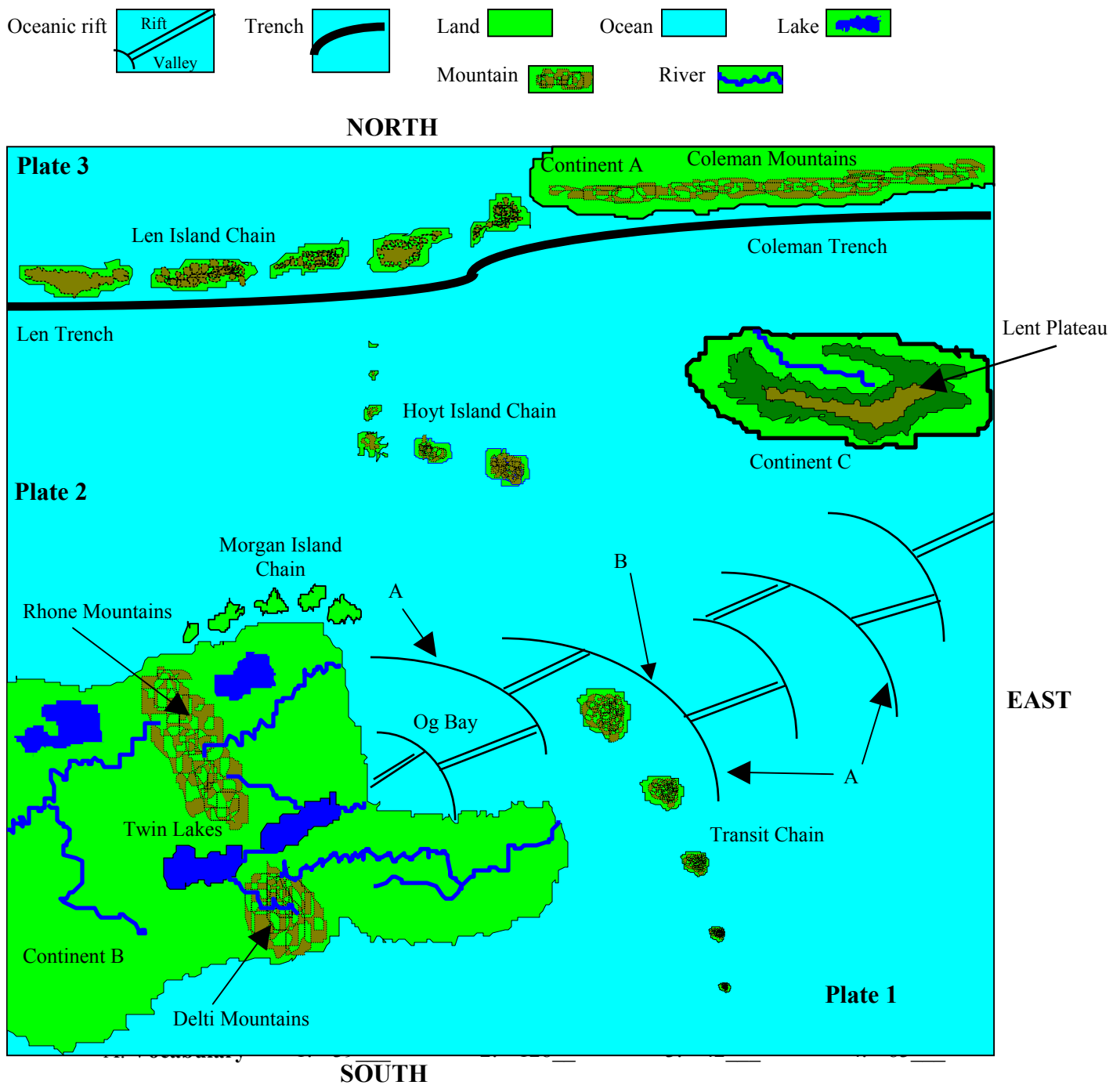
10. Plate 2 is the over-riding plate along the northern boundary with Plate 3.

11. B is a fracture zone.

12. The islands in the Len Chain become progressively older towards the west.

13. The Rhone and Delti mountains were once a continuous mountain chain.
14. The oldest island in the Transit Chain is the large island to the north.
15. If current plate motion continues into the distant future, a structural mountain chain will develop along the northern coast of continent C.
16. The oldest island in the Hoyt Island chain is the one farthest to the north.
17. The Len, Hoyt and Transit islands are all probably composed of basalt.
18. Og Bay is wider to the northeast than to the southwest because the spreading pole is located to the north east.

F. **On the map**, locate the spreading pole for plate 2.



- | | | | |
|-----------|-------------------|-------------------------|----------|
| 5. 22__ | 34. 31__ | 18. T__ | 17. T__ |
| | 35. 17__ | 19. T__ | 18. ____ |
| 6. 10__ | | 20. ____ | |
| 7. 35__ | 36. 110__ | | |
| 8. 127__ | 37. 87__ | 21. ____ | |
| 9. 88__ | 38. 43__ | 22. T__ | |
| 10. 14__ | 39. 111__ | 23. ____ | |
| | 40. 37__ | 24. ____ | |
| 11. 49__ | | 25. T__ | |
| 12. 64__ | 41. 120__ | | |
| 13. 63__ | 42. 2__ | 26. T__ | |
| 14. 9__ | 43. 55__ | 27. ____ | |
| 15. 23__ | 44. 59__ | 28. ____ | |
| | | 29. T__ | |
| 16. 85__ | B. Content | 30. ____ | |
| 17. 80__ | 1. T__ | | |
| 18. 89__ | 2. ____ | 31. ____ | |
| 19. 47__ | 3. ____ | 32. ____ | |
| 20. 13__ | 4. T__ | 33. ____ | |
| | 5. T__ | 34. ____ | |
| 21. 52__ | | 35. T__ | |
| 22. 61__ | 6. ____ | 36. ____ | |
| 23. 95__ | 7. T__ | 37. T__ | |
| 24. 132__ | 8. T__ | | |
| 25. 56__ | 9. T__ | C. Cross Section | |
| | 10. T__ | A. 2__ | |
| 26. 101__ | | B. 6__ | |
| 27. 3__ | 11. ____ | C. 1__ | |
| 28. 16__ | 12. ____ | D. 11__ | |
| 29. 92__ | 13. ____ | E. 12__ | |
| 30. 91__ | 14. ____ | F. 3__ | |
| | 15. T__ | G. 10__ | |
| 31. 108__ | | H. 4__ | |
| 32. 133__ | 16. T__ | I. 7__ | |
| 33. 105__ | 17. T__ | | |
-
- | | |
|--|----------------------|
| | D. Structures |
| | A. 2__ |
| | B. 7__ |
| | C. 11__ |
| | D. 1__ |
| | E. 3__ |
| | F. 5__ |
| | G. 9__ |
| | H. 7__ |
| | I. 4__ |
-
- | | |
|--|---------------------------|
| | E. Plate Tectonics |
| | 1. ____ |
| | 2. T__ |
| | 3. ____ |
| | 4. ____ |
| | 5. ____ |
| | 6. T__ |
| | 7. ____ |
| | 8. T__ |
| | 9. T__ |
| | 10. ____ |
| | 11. ____ |
| | 12. ____ |
| | 13. T__ |
| | 14. ____ |
| | 15. T__ |
| | 16. T__ |
-
- | | |
|--|------------------------|
| | F. Place On Map |
| | East-northeast of |
| | Twin lakes |

Earth Systems Section 2 Test 2-4

A. **Vocabulary.** Select the most appropriate word from the word bank.

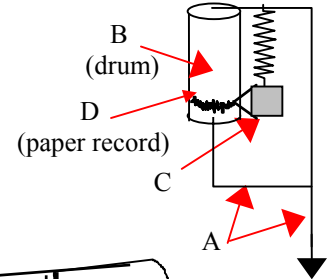
1. Physical state in which volume and shape are set.
2. Heat inside the Earth is generated through this process.
3. Points on the Earth's surface towards which compass needles align themselves.
4. Term for when the negative end of a crystal's magnetic field faces the North.
5. Fastest and most efficient wave type; able to pass through any material regardless of physical state.
6. Lithospheric plate that contains only sea floor.
7. Term for the point on the Earth's surface directly above a mantle plume.
8. Partially buried sea floor volcanoes which are less than 1000m tall.
9. These are the least dense rocks of the Earth.
10. Area related to a trench where earthquake foci become progressively deeper.
11. Lethal stream of high energy particles from the Sun which are deflected by Earth's magnetic field.
12. Elongate uplifted block of strata bounded on opposing sides by faults.
13. This scale is used to compare wave motion at foci.
14. Chain of large volcanoes originating at and oriented perpendicularly to the oceanic ridge.
15. Process whereby plates pull apart and move away from each other.
16. This force applied to rock layers can not produce folding.
17. All of the earthquake precursors are produced by this increase in volume as rocks crack.
18. That part of the Earth's surface where seismic recording systems record neither S nor P waves.
19. Process whereby one plate slides below another and into the asthenosphere.
20. Scars left on a plate by a transform fault.
21. A giant sea wave produced by an earthquake, landslide, volcanic explosion or meteoric impact.
22. This type of mountain chain forms where continents collide.
23. Point on the Earth's surface about which a plate rotates as it moves because of plate tectonics.
24. The study of earthquakes.
25. Change in temperature with depth within the Earth.
26. Another name for a rift valley.
27. General term meaning the orientation of a magnetic field.
28. When P-waves reach an interface, this type of surface wave is generated.
29. This boundary of an ocean basin may represent the side of the rift valley that formed before the ocean existed.
30. Phenomenon whereby waves bounce off interfaces.
31. The very deepest parts of the ocean floor.
32. Point within the Earth where rocks break and earthquakes begin.
33. Below this temperature, about 453°C, crystals in a cooling melt can no longer move.
34. The name of Earth's magnetic field.
35. Scratches and gouges on a fault plane that indicates direction of fault block motion.
36. Phenomenon whereby sediments become fluid as pore spaces collapse and water escape to the surface during an earthquake.
37. The young portion of the oceanic ridge that is not buried by sediment.
38. Hypothesis that continents were pushed across the Earth's surface by expanding oceanic crust.
39. This part of a seismic recording system remains motionless during an earthquake.
40. Term for a super-heated mass of material in which some electrons are free to move between atoms.
41. Name for an interface that indicates a distinct compositional change between layers in the Earth.
42. The difference between the arrival times of a P -wave and an S-wave.
43. Small earthquakes that occur before a major one.

B. Content. Place a **T** in the blank for true statements. *Leave blanks empty for false statements.*

1. Both increasing pressure and increasing temperature favor a material remaining solid.
2. Volcanic eruptions are likely to occur along the length of a mid-ocean ridge.
3. Earth's gravitational field indicates that the interior of the Earth must be composed of a heavy dense material.
4. To determine the location of a distant focus requires three seismometers: one vertical and two horizontal.
5. Away from the ridge crest, sea floor increases in age and sediments increase in thickness.
6. Earthquake wave speed increases greatly at the Mohorovicic Discontinuity as they travel from the crust into the mantle.
7. The outer core is liquid and the inner core solid because the outer core is hotter than the inner core.
8. Precursors suggest, but do not predict, that an earthquake will occur.
9. Paleomagnetism allows the location of the spreading poles to be determined.
10. Reflection of earthquake waves occurs at all boundaries between rock layers within the Earth.
11. The oldest fossils in the ocean basin should be located directly adjacent to the continents.
12. Structural and volcanic mountain chains on continents indicate plate convergence.
13. To be considered an earthquake, it must be felt by people.
14. Samples of the core demonstrate that it is composed of cobalt, iron and nickel.
15. Quicksand is a precursor for earthquakes.
16. Most of the Pacific and the Atlantic sea floor consist of abyssal plains.
17. Earthquake wave speed decreases in the asthenosphere and outer core but increases with depth everywhere else.
18. Plates begin as microplates and gradually grow to become major plates on the Earth's surface.
19. Body waves can not travel across surfaces and surface waves can not travel through the Earth.
20. The geolithosphere can be divided into five layers based upon composition and three layers based upon physical state.
21. Refraction bends earthquake waves towards the surface in some parts of the Earth, but towards the interior in other parts.
22. Each plate has its own axis of rotation and the location of the axis changes as plate motion changes.
23. P-waves always arrive at a seismic recording station before S-waves.
24. As temperature increases, atoms or molecules in a material tend to move apart.
25. In S-waves the particles vibrate perpendicularly to the direction the wave travels.
26. Rift valleys are only found on continents.
27. Earthquake wave speed increases as density and rigidity of material increases.
28. To record all earthquake motion requires three seismometers: two vertical and one horizontal.
29. Earth's magnetic field is generated by differential rotational speed of the inner core and the remainder of the geolithosphere.
30. Foci of earthquakes related to subduction are equally distributed on both sides of the trenches.
31. Earthquake magnitude is usually greater nearer to the epicenter than to the focus.
32. Continental shelves and slopes tend to be narrowest adjacent to a trench.
33. Location of the shadow zones is always relative to the location of the earthquake's epicenter.
34. The outer rigid mantle is solid and the asthenosphere is plastic because the asthenosphere is hotter than the outer rigid mantle.
35. Deep focus earthquakes mainly occur at convergent boundaries.
36. The inner core and the outer core rotate in opposite directions.
37. The difference between earthquakes of magnitude 2 and 4 would be a factor of 100 in terms of wave motion, but a factor of 1024 in terms of energy released.
38. The S-wave shadow zone is always larger than the P-wave shadow zone.
39. Before a major earthquake radon gas in a well may decrease and magnetism may be altered.
40. Polar wandering curves indicate the positions of the magnetic poles in the geologic past.

41. Volcanism is mainly associated with divergent and convergent boundaries and with hot spots.
42. Two adjacent anticlines automatically form a syncline between them and two adjacent synclines automatically form an anticline between them.

C. Identify the parts of the seismic recording system illustrated below. **Select answers from the Word Bank** and place the corresponding **number** on the Answer Sheet.



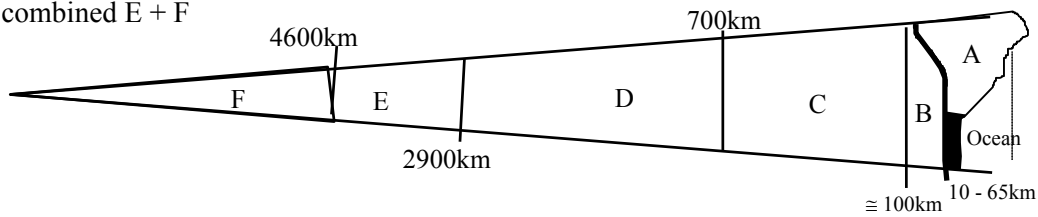
D. Diagrams

1. Using the terms in the **Word Bank**, identify each of the lettered parts on the of the **cross section of the Earth** and the list (G-K) below.

G = combined A + B **J** = Boundary between A and B

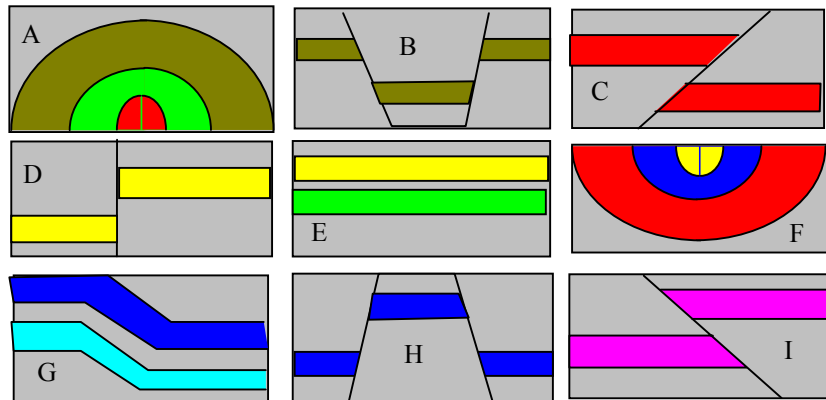
H = combined B + C + D **K** = A through F

I = combined E + F



E. **Structures.** Identify each of the following structures **illustrated in cross section** employing the terms from the **word bank to the left**.

1. anticline
2. graben
3. horizontal beds
4. horst
5. monocline
6. normal fault
7. reverse fault
8. rotational fault
9. syncline
10. transform fault
11. vertical fault

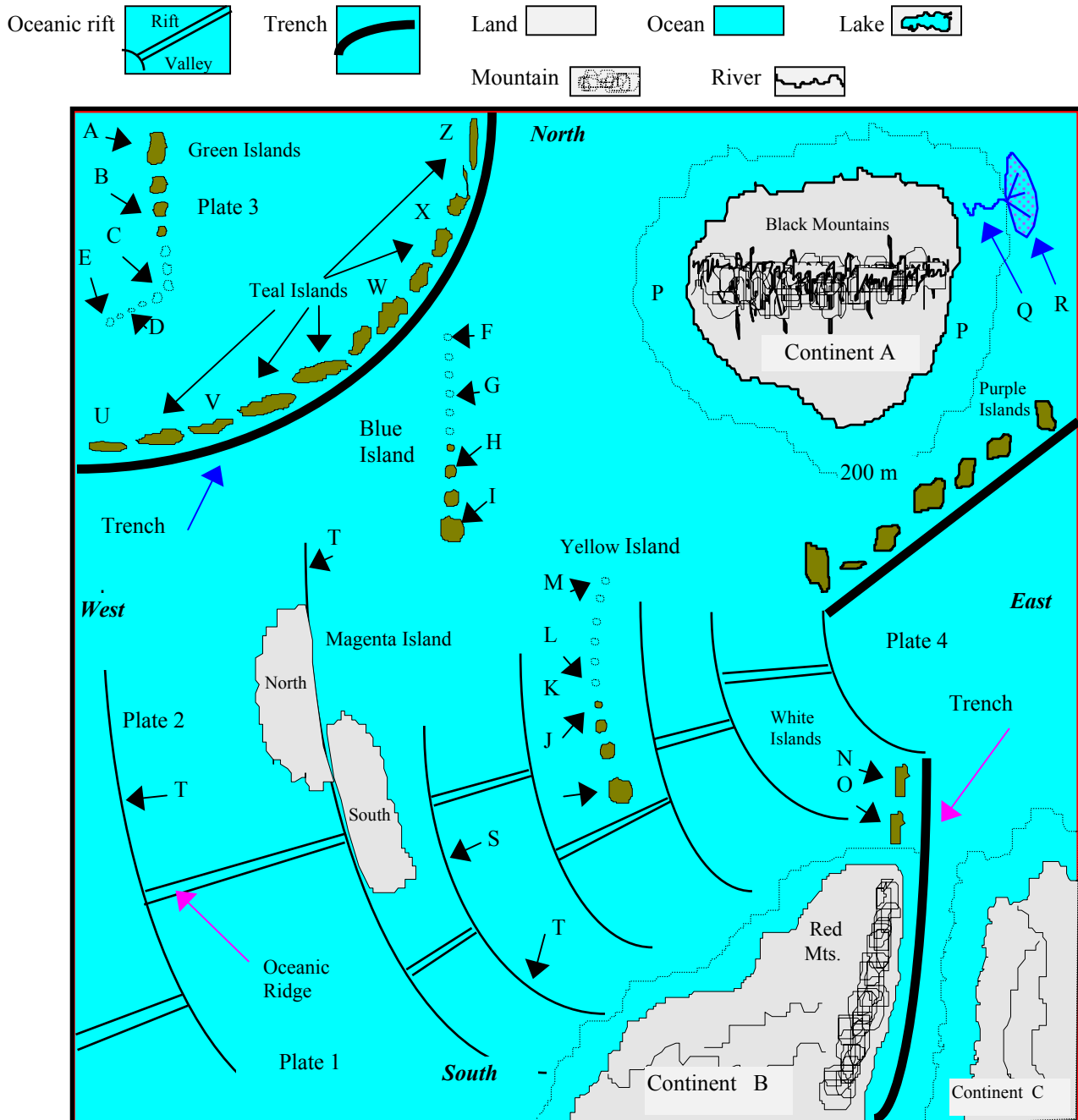


G. **Plate Tectonics.** Answer these questions based upon the evidence shown on the map on the next page. Place a **T** in the blank for all true statements. **Leave blanks empty if false.**

1. White, Teal and Purple islands are all island arcs.
2. Blue Islands were produced by a hot spot.
3. Feature S is a transform fault.
4. Feature T is a transform fault.
5. Area P is a continental shelf occupied by an epicontinental sea.
6. Plate 1 is moving to the southeast.
7. Plate 2 is moving northward.
8. If present motion continues Continent C and B will collide and form a volcanic mountain chain.
9. Black Mountains on Continent A were formed by continental collision in the past.
10. Yellow Islands were produced by a hot spot.
11. Feature Q is a submarine fan and feature R is a submarine canyon.
12. Evidence indicates that Plate 2 originally moved toward the southeast.
13. The oldest island in the Blue Island chain is F.

14. Feature T on Plate 2 likely continues northward to the trench, but is buried by sediments.
15. Linear rifting near Magenta Island should be faster than linear rifting near White Islands.
16. All islands in an island arc are likely to be about the same age.
17. The oldest island in the Purple island chain is at the southwest end of the chain.
18. Red and Black mountains are likely volcanic in origin.
19. Island arcs gradually migrate towards the trench and are eventually subducted into it.

5 points G. **On the map** place an X at the location of the spreading pole for plate 2.



A. Vocabulary

1. 89__

2. 26__

3. 48__

4. 58__

5. 72__

6. 60__

7. 38__

8. 43__

9. 8/15_

10. 5__

11. 88__

12. 37__

13. 51__

14. 57__

15. 81__

16. 99__

17. 17__

18. 97__

19. 93__

20. 29__

21. 106__

22. 91__

23. 90__

24. 84__

25. 33__

26. 34__

27. 70__

28. 75__

29. 13__

30. 76__

31. 105__

32. 27__

33. 16__

34. 50__

35. 87__

36. 45__

37. 79__

38. 83__

39. 39__

40. 66__

41. 18__

42. 44__

43. 71__

B. Content

1. ____

2. ____

3. T__

4. ____

5. T__

6. T__

7. ____

8. T__

9. ____

10. T__

11. T__

12. T__

13. ____

14. ____

15. ____

16. ____

17. T__

18. ____

19. T__

20. ____

21. T__

22. T__

23. T__

24. T__

25. T__

26. ____

27. T__

28. ____

29. T__

30. ____

31. ____

32. T__

33. T__

34. T__

35. T__

36. ____

37. T__

38. T__

39. ____

40. ____

41. T__

42. T__

C. Seismometer

A. 102_

B. 74_

C. 39_

D. 85_

D. Diagram

A. 8/15_

B. 62_

C. 4_

D. 54_

E. 61_

F. 40_

G. 47/10

H. 52_

I. 56_

J. 56_

K. 32_

E. Structures

A. 1__

B. 2__

C. 7__

D. 11__

E. 3__

F. 9__

G. 5__

H. 4__

I. 7__

F. Plate Tectonics

1. T__

2. T__

3. T__

4. ____

5. T__

6. T__

7. T__

8. ____

9. T__

10. ____

11. ____

12. ____

13. T__

14. T__

15. T__

16. T__

17. ____

18. ____

19. ____

G. Place On MapJust south o the
words "Plate 4".

- A**
 1. abyssal hills
 2. abyssal plains
 3. arc
 4. asthenosphere
- B**
 5. Benioff Zone
 6. body waves
- C**
 7. compression
 8. continental crust
 9. continental drift
 10. continental plate
 11. continental rise
 12. continental shelf
 13. continental slope
 14. core
 15. crust
 16. Curie Point
- D**
 17. dilatancy
 18. discontinuity
 19. displacement
 20. downthrown block
- E**
 21. epicenter
 22. epicontinental
 23. erosional mountains
- F**
 24. fault plane
 25. fault trace
 26. fission
 27. focus
 28. foreshocks
 29. fracture zone
 30. fusion
- G**
 31. gas
 32. geolithosphere
33. geothermal gradient
 34. graben
 35. gravity
 36. Gutenberg Discontinuity
- H**
 37. horst
 38. hot spot
- I**
 39. inertia member
 40. inner core
 41. intensity scale
 42. island arc
- K**
 43. knolls
- L**
 44. lag time
 45. liquefaction
 46. liquid
 47. lithosphere
- M**
 48. magnetic poles
 49. magnetic reversals
 50. magnetosphere
 51. magnitude scale
 52. mantle
 53. mantle plume
 54. mesosphere
 55. microplates
 56. Mohorovicic Discontinuity
- N**
 57. nemathat
 58. normal polarity
- O**
 59. oceanic crust
 60. oceanic plate
 61. outer core
62. outer rigid mantle
 63. over-riding plate
- P**
 64. paleomagnetism
 65. pericontinental
 66. plasma
 67. plastic
 68. plastic deformation limit
 69. plate harmonics
 70. polarity
 71. precursors
 72. P-wave
 73. P-wave shadow zone
- R**
 74. recorder
 75. Rayleigh Wave
 76. reflection
 77. refraction
 78. reverse polarity
 79. ridge crest
 80. rift valley
 81. rifting
 82. rotational fault
- S**
 83. sea floor spreading
 84. seismology
 85. seismogram
 86. shelf break
 87. slickenslides
 88. solar wind
 89. solid
 90. spreading poles
 91. structural mountains
 92. subducted plate
 93. subduction
 94. submarine canyon
 95. submarine fan
 96. surface waves
 97. S-wave shadow zone
98. S-waves
- T**
 99. tension
 100. thrust fault
 101. topographic inversion
 102. transducer
 103. transform fault
 104. translation fault
 105. trench
 106. tsunami
 107. turbidity current
- U**
 108. upthrown block
 109. upwelling
- V**
 110. vertical fault
 111. volcanic mountains

Earth Systems Section 2 Test 2-5

A. Vocabulary. Select the most appropriate word from the word bank.

1. Term for the state of a material that is heated to such a high temperature that outer electrons become free of their atoms.
2. Points on the Earth's surface towards which compass needles point.
3. Scale that measures the amount of shaking that occurs at a locality during an earthquake.
4. Term for small lithospheric plates of only a few thousand square kilometers.
5. Physical state in which matter has a given volume but no shape and the matter flows slowly.
6. Points on the Earth's surface about which the Earth turns each day.
7. Exposed portions of an oceanic ridge nearly devoid of sediment.
8. Phenomena which sometimes occur before a major earthquake.
9. Below this temperature the paleomagnetism of igneous rocks becomes set and does not change.
10. Point on the Earth's surface about which a plate rotates as it moves across Earth's surface.
11. Phenomenon whereby earthquake waves bend toward areas where they travel more slowly.
12. Term for the point inside of the Earth where rocks break and earthquakes begin.
13. When stressed beyond this point, rocks behave as a brittle solid, not a plastic.
14. Source of heat for the interior of the Earth.
15. Term for Earth's magnetic field with the opposite polarity to what exists today.
16. Hypothesis that continents plowed through the oceanic crust similar to icebergs in the ocean.
17. General term for all waves that travel through the Earth.
18. Phenomenon whereby anticlines erode to become valleys and synclines mountains.
19. General name for a all giant sea wave regardless their origin.
20. Name for the area of earthquakes associated with trenches and subduction.
21. A hot spot is the area directly above this phenomenon.
22. Stress or force exerted upon part of the lithosphere that causes rifting.
23. Name for the flooded edge of a continent, not the water that covers it.
24. Name for the study of earthquakes.
25. Term for the gradual change in temperature with depth.
26. Flattest and most featureless part of the ocean floor.
27. Term for the interval between the arrival of the P-waves and the S-waves at a given locality.
28. Term for small earthquakes that occur before a major one.
29. This is the driving force or energy that produces convection in the asthenosphere and plate tectonics.
30. Phenomenon that occurs during an earthquake as escaping water turns sediments into a fluid.
31. Name of Earth's magnetic field.
32. Name for the volcanic mountain chains that extend along the center of some ocean basins.

B. Content. On the Answer Sheet place a **T** in the blank for all true statements. *Leave blanks empty for all false statements.*

1. No S- or P-waves exist in the P-wave shadow zone, but P-waves occur throughout the S wave shadow zone.
2. Death Valley and the Dead Sea represent the initial stages in the formation of trenches.
3. Reflection only occurs at interfaces, but refraction can occur throughout a material.
4. Synclines are formed by tension and anticlines by compression.
5. During an earthquake, the inertia member is motionless and the recorded moves on a seismometer.
6. Horst are produced by paired normal faults and grabens by paired reverse faults.
7. All anticlinal and synclinal folds eventually plunge.
8. The shadow zones would not exist if the outer core was solid.
9. Temperature increases in some areas and decreases in others from the surface to Earth's center.
10. Earth can be divided into three layers based upon composition and five on physical state.
11. P-waves can pass through all physical states and are faster than S-waves and L-waves.

12. Slickenslides can indicate which side is upthrown and which is downthrown.
13. The asthenosphere is less dense than the lithosphere because solids are more dense than plastics.
14. With time the continental rise will extend farther seaward at the expense of the abyssal plains and the abyssal plains will extend seaward at the expense of the abyssal hills.
15. P-waves generate L-waves at each unconformity, but S-waves do not.
16. Continental plates contain no oceanic crust within their boundaries
17. When deposited, most sedimentary layers are nearly horizontal.
18. Dilatancy appears to be responsible for all of the precursors to earthquakes.
19. Magnetic reversals occur when the inner core slows, stops and begins to rotate in the opposite direction.
20. Earthquake wave speed continuously increases from the surface to the center of the Earth.
21. Structural mountain chains do not occur in the ocean basin.
22. Continents are never subducted below oceanic crust.
23. Earthquakes are rare events and only a few dozen occur each year.
24. Simple rotational faults are part normal fault, part reversal fault and part transform fault.
25. Samples of the core indicate that it is rich in iron, nickel and cobalt.
26. Without a liquid outer core and solid inner core Earth would have no magnetic field.
27. Three seismic recording systems are required at a location to locate the epicenter of an earthquake.
28. Island arcs can be located on either the subducted or over-riding plates, but volcanic mountain chains are only on the over-riding plate.
29. Polar wandering curves tell more about the movement of plates than the movement of the magnetic poles.
30. The physical state of a material is controlled by the interaction of temperature and pressure relative to the composition of the material.
31. Tension can not produce faulting.
32. Rayleigh waves can only travel through solids and liquids, but not gases.
33. The liquid outer core is less dense than the solid mesosphere because liquids are less dense than solids.
34. The abyssal plains are relatively smooth because the underlying oceanic crust is also smooth.
35. A gas has no set shape, but does have a set volume.
36. Lava flows forming pillow basalt commonly occur during transform motion on the sea floor.
37. Earthquake intensity and magnitude decrease with distance from the epicenter.
38. Oceanic crust gets progressively older towards the trenches.

C. Plate Tectonics. The following maps refer to the map on the following page. On the Answer Sheet place a **T** in the blank for all true statements. *Leave blanks empty for all false statements.*

1. Area A is a pericontinental sea.
2. B is a transform fault and C is a fracture zone.
3. Plate 1 is moving towards the northeast relative to Plate 2.
4. Hope Islands (center of map) were produced by a hot spot.
5. In the Hope Island chain island E is younger than island F.
6. Continents A and B were once the same landmass.
7. Plate 4 is the over-riding plate relative to Plate 3.
8. Dalick Islands (on Plate 4) are an island arc.
9. If present motion continues far into the future, structural mountains would be expected to form along the west and southwest coast of continent C
10. The lake on Continent C probably is located in a rift valley.
11. Malick Islands (north center of map) were formed as a neothetis.
12. Evidence suggests that Continent A is composed of two land masses that collided.

13. Lancor Mountains on Continent B are probably structural, but Neiler Mountains and Kirk Mountains are probably volcanic.
14. Rocks composing the North and South Ambry Mountains are most likely andesite, but the rocks of the Faith Islands probably are composed of basalt.
15. In the Taku Island Chain (north center of map) Island V is probably older than Island S.
16. Rate of plate tectonic movement is faster in area W than in area R.
17. The Malick Island Chain (north center of map) indicates that Plate 3 once moved to the west.
18. The Pocco Mountains of Continent A and Lancor Mountains of Continent B were once a continuous mountain chain
19. Plates 2 and 3 are moving in opposite directions.
20. Faith Islands, Hope Islands, Malick Islands, Ry Islands (east center of map) and Taku Islands are all probably composed of basalt.
21. Dalick Islands are most likely composed of granite.

D. **On the map**, locate the spreading pole for plate 2.

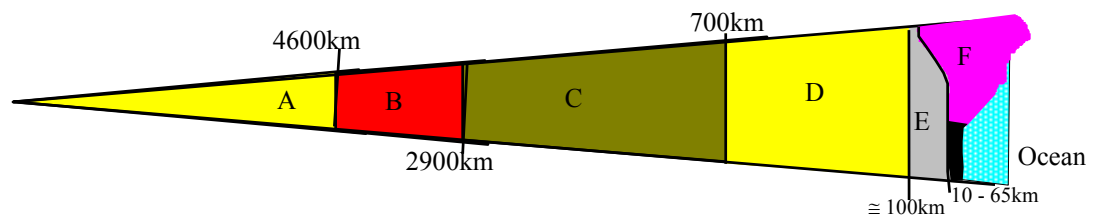
E. Diagrams

1. Using the terms in the word bank to the right, identify each of the lettered parts on the of the **cross section of the Earth**.

- G = Boundary between E and F
- H = Entire rock portion of Earth
- I = Boundary between C and B
- J = Combined A + B
- K = Combined E + F
- L = Combined C + D + E

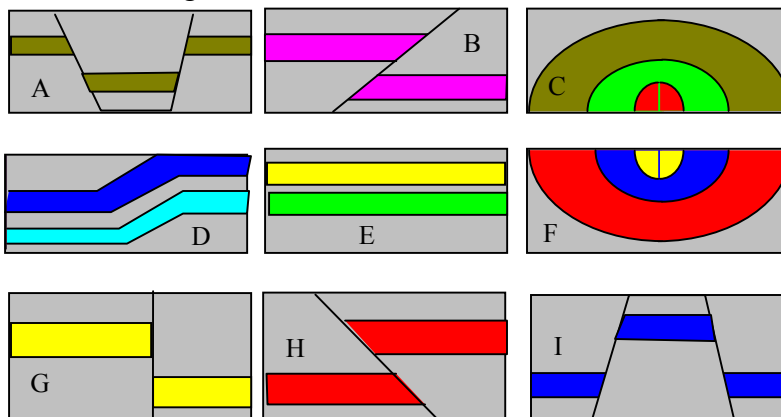
WORD BANK

- | | |
|------------------------------|----------------------------|
| 1. asthenosphere | 7. core |
| 2. crust | 8. geolithosphere |
| 3. inner core | 9. Gutenberg Discontinuity |
| 4. mantle | 10. lithosphere |
| 5. Mohorovicic Discontinuity | 11. mesosphere |
| 6. outer rigid mantle | 12. outer core |

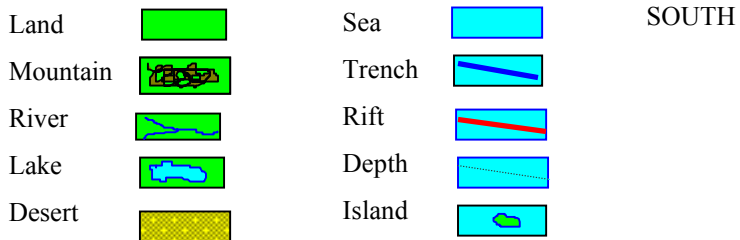
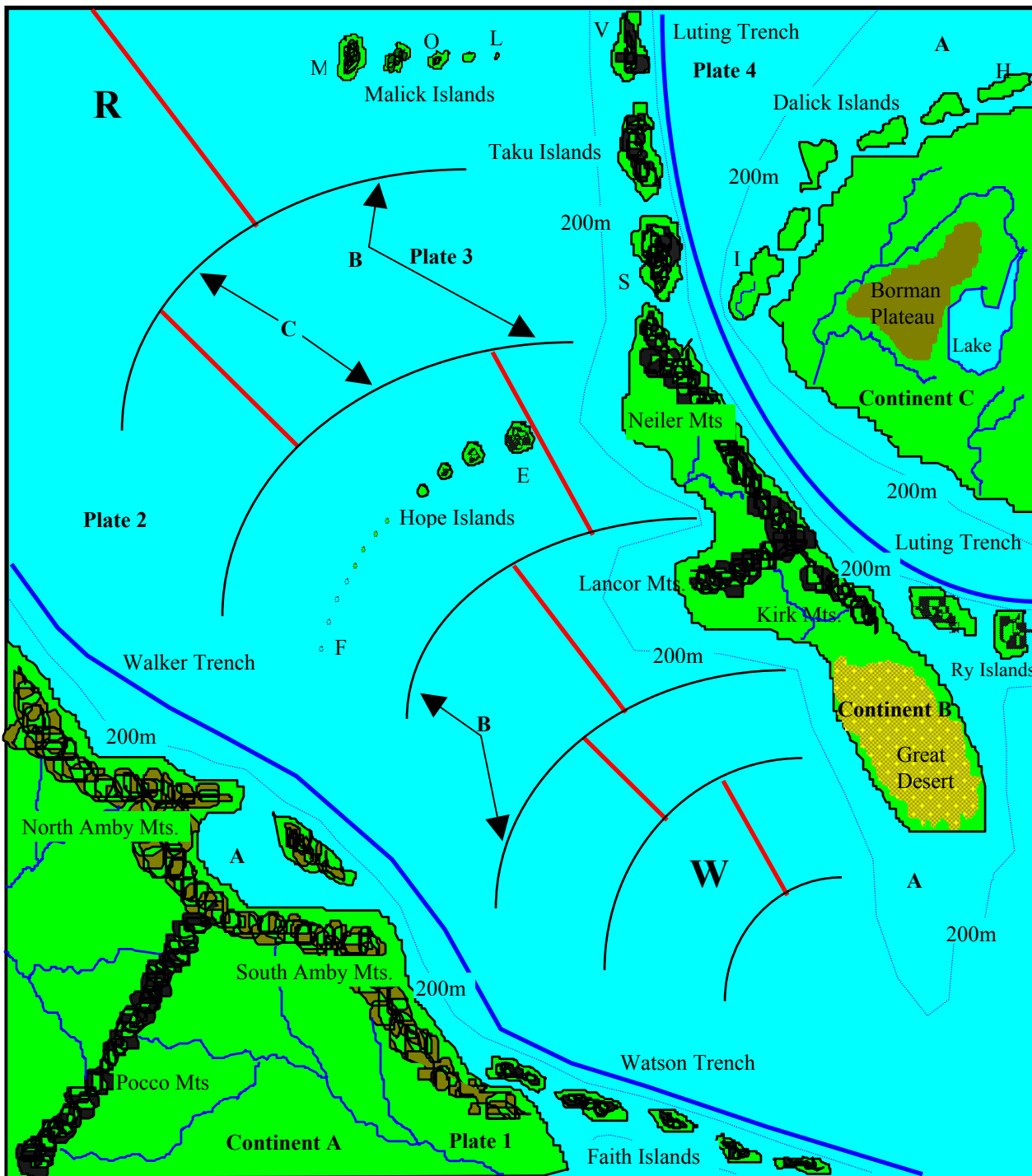


F. **Structures**. Identify each of the following structures **illustrated in cross section** employing the terms from the word bank to the right.

1. anticline
2. graben
3. horizontal beds
4. horst
5. monocline
6. normal fault
7. reverse fault
8. rotational fault
9. syncline
10. transform fault
11. vertical fault



NORTH



A. Vocabulary

1. 69__
2. 51__
3. 43__
4. 58__
5. 70__
6. 88__
7. 84__
8. 75__
9. 17__
10. 97__
11. 82__
12. 28__
13. 71__
14. 27__
15. 83__
16. 10__
17. 7__
18. 108__
19. 113__
20. 6__
21. 56__
22. 106__
23. 13/14
24. 91__
25. 34__
26. 2__
27. 46__
28. 29__
29. 38/27

30. 47__

31. 53__

32. 64__

B. Content

1. ____
2. ____
3. T__
4. ____
5. T__
6. ____
7. T__
8. T__
9. ____
10. T__
11. T__
12. ____
13. ____
14. T__
15. ____
16. ____
17. T__
18. T__
19. ____
20. ____
21. T__
22. T__
23. ____
24. ____

25. ____

26. T__

27. ____

28. ____

29. T__

30. T__

31. ____

32. ____

33. ____

34. ____

35. ____

36. ____

37. ____

38. T__

C. Plate Tectonics

1. T__
2. ____
3. T__
4. ____
5. T__
6. T__
7. ____
8. ____
9. T__
10. ____
11. ____
12. T__

13. T__

14. T__

15. ____

16. ____

17. ____

18. T__

19. T__

20. T__

21. T__

D. Place On Map
Southeast of
"W"**E. Cross Section**

- A. 3__
- B. 12__
- C. 11__
- D. 1__
- E. 6__
- F. 2__
- G. 5__
- H. 8__
- I. 9__
- J. 7__
- K. 10__
- L. 4__
- F. Structures
- A. 2__
- B. 7__
- C. 1__

D. 5__

E. 3__

F. 9__

G. 11__

H. 7__

I. 4__

- A**
1. abyssal hills
 2. abyssal plains
 3. aftershocks
 4. arc
 5. asthenosphere
- B**
6. Benioff Zone
 7. body waves
- C**
8. compression
 9. continental crust
 10. continental drift
 11. continental plate
 12. continental rise
 13. continental shelf
 14. continental slope
 15. core
 16. crust
 17. Curie Point
- D**
18. dilatancy
 19. discontinuity
 20. displacement
 21. downthrown block
- E**
22. epicenter
 23. epicontinental
 24. erosional mountains
- F**
25. fault plane
 26. fault trace
 27. fission
 28. focus
 29. foreshocks
 30. fracture zone
 31. fusion
- G**
32. gas
- H**
33. geolithosphere
 34. geothermal gradient
 35. graben
 36. gravity
 37. Gutenberg Discontinuity
- I**
41. inertia member
 42. inner core
 43. intensity scale
 44. island arc
- K**
45. knolls
- L**
46. lag time
 47. liquefaction
 48. liquid
 49. lithosphere
- M**
50. macroplate
 51. magnetic poles
 52. magnetic inversal
 53. magnetosphere
 54. magnitude scale
 55. mantle
 56. mantle plume
 57. mesosphere
 58. microplates
 59. Mohorovicic Discontinuity
- N**
60. nemathat
 61. normal polarity
- O**
62. oceanic crust
- P**
63. oceanic plate
 64. oceanic ridge
 65. outer core
 66. outer rigid mantle
 67. over-riding plate
- R**
79. recorder
 80. Rayleigh Wave
 81. reflection
 82. refraction
 83. reverse polarity
 84. ridge crest
 85. rift valley
 86. rifting
 87. rotational fault
 88. rotational poles
- S**
89. sea floor spreading
 90. seismic sea wave
 91. seismology
 92. seismogram
 93. shelf break
 94. slickenslides
 95. solar wind
 96. solid
 97. spreading pole
 98. structural mountains
 99. subducted plate
 100. subduction
 101. submarine canyon
 102. submarine fan
 103. surface waves
- T**
104. S-wave shadow zone
 105. S-waves
 106. tension
 107. thrust fault
 108. topographic inversion
 109. transducer
 110. transform fault
 111. translation fault
 112. trench
 113. tsunami
 114. turbidity current
- U**
115. upthrown block
 116. upwelling
- V**
117. vertical fault
 118. volcanic mountains